CHAPTER II

ALTERNATIVES INCLUDING THE PROPOSED ACTION

INTRODUCTION

This chapter summarizes the content of the Final Environmental Impact Statement (FEIS). It covers the changes made in the alternatives and their analysis in response to public comments on the Draft Environmental Impact Statement (DEIS), describes the process used to develop a full range of alternatives for the FEIS, describes the goals and management objectives of each alternative, and compares the physical, biological, social, and economic outputs and effects of the alternatives considered in detail.

Chapter II focuses on alternatives and is linked directly to other parts of the FEIS. Alternatives were developed in response to the issues described in Chapter I and Appendix A. Chapter III discusses the environment which would be affected by management of the Forest in the alternatives. Chapter IV discusses the consequences of alternatives on the environmental components in detail. These consequences are represented in part by the outputs and effects presented in Chapter II. The analysis tools and processes summarized here are presented in detail in Appendix B, Description of the Analysis Process.

This FEIS presents in detail seven different alternatives for managing the lands and resources of the Forest. These alternatives explore a variety of ways of responding to the issues identified during the planning process. Each alternative represents a unique combination of land allocations, management prescriptions, activity scheduling, and results in different mixes of goods and services, land uses, and environmental effects result.

The planning regulations (36 CFR 219.12(e) and (f)) require an analytical process which includes an evaluation of various minimum and maximum resource and economic production levels. In addition, a wide range and relatively even distribution of alternatives must be developed to respond to issues and to reflect national goals such as the Resources Planning Act (RPA) program.

In some alternatives the Forest would be managed to emphasize the production of commodities with a market price. Other alternatives would emphasize resources that do not have a market price, such as dispersed recreation, wildlife, and scenery. One alternative, the No Change Alternative, reflects current management direction projected into the future. Another alternative, the No Action Alternative, reflects current management direction projected into the future including NFMA requirements. Two alternatives were developed in response to requests from public interest groups. One alternative was developed in response to public comments on the DEIS.

This broad range of alternatives provides the Regional Forester with the information needed to identify the alternative which comes nearest to maximizing net benefits to the public.

The basis for developing alternatives is outlined in the implementing regulations of the National Environmental Policy Act (NEPA) and the National Forest Management Act (NFMA). NEPA regulations (40 CFR 1502.14) direct agencies to:

- Rigorously explore and objectively evaluate all reasonable alternatives; and for alternatives which were eliminated from detailed study, briefly discuss the reasons for their having been eliminated.
- Devote substantial treatment to each alternative considered in detail, including the Proposed Action, so that reviewers may evaluate their comparative merits.
- Include reasonable alternatives not within the jurisdiction of the lead agency.
- Include a No Action alternative.
- Identify the agency's Preferred Alternative (PA) as the Proposed Action.
- Include appropriate mitigation measures not already included in the Proposed Action or other alternatives.

The implementing regulations (36 CFR 219.12(f)) for the National Forest Management Act (NFMA) contain the following requirements for alternative formulation:

- Alternatives shall be distributed between the minimum resource potential and the maximum resource potential to reflect to the extent practicable the full range of major commodity and environmental resource uses and values that could be produced from the Forest. Alternatives shall reflect a range of resource outputs and expenditure levels; however, potential budgetary limitations do not constrain resource outputs.
- Alternatives shall be formulated to facilitate analysis of opportunity costs and of resource uses and environmental trade-offs among alternatives and between benchmarks and alternatives.
- Alternatives shall be formulated to facilitate evaluation of the effects on present net value (PNV), benefits, and costs of achieving various outputs and values that are not assigned monetary values are provided at specified levels.
- Alternatives shall provide different ways to address and respond to the major public issues, management concerns, and resource opportunities identified during the planning process.
- Reasonable alternatives which may require a change in existing law or policy to implement shall be formulated (if necessary) to address a major public issue, management concern, or resource opportunity identified during the planning process (40 CFR 1501.7, 1502.14(c)).
- At least one alternative shall be developed which responds to and incorporates the RPA Program tentative resource objectives for each Forest displayed in the Regional Guide.
- At least one alternative shall reflect the current level of goods and services provided by the unit and the most likely amount of goods and services expected to be provided in the future if current management direction continues. Pursuant to NEPA procedures this alternative shall be deemed the No Action Alternative.

- Each alternative shall represent to the extent practicable the most cost-efficient combination of management prescriptions examined that can meet the objectives established in the alternative.

- Each alternative shall state at least the condition and uses that will result from long-term application of the alternative, the goods and services to be produced, the timing and flow of these resource outputs together with associated costs and benefits, the resource management standards and guidelines (S&Gs), and the purposes of the management direction proposed.

Alternatives were developed with varying levels of supply potential for the high level of demand for most resources found on the Willamette National Forest (WNF). The ability of the Forest to respond to the levels of demand for the resources was determined through benchmark analysis of key resources. These benchmark analyses identified the range of supply potential possible for both priced and nonpriced resources. Priced resources are those which have a quantified market price, while nonpriced resources are those which are not exchanged through the marketplace. The comparison of alternatives in the latter section of this chapter shows the ability of the alternative to meet identified demand levels.

The planning regulations and agency direction emphasize the use of economic efficiency criteria in the major analytical phases of the planning process. The development of management prescriptions, analysis of benchmarks, management constraints, and alternatives are steps which focus on cost-efficiency and the calculation of economic and resource trade-offs.

CHANGES BETWEEN DRAFT AND FINAL

The DEIS and Proposed Forest Plan documents were available for public review for approximately 5 months (January to May, 1988). The public review process and comments received during the review period are described in the FEIS Chapter I, Appendix A, and Appendix I. After the public comment period had closed and the comments had been reviewed, the Forest interdisciplinary team (IDT) explored ways to respond to the concerns of the public. (A complete discussion of content analysis and Forest responses to substantive comments are in Appendix I.)

Many of the comments suggest:

- Alternatives be modified;
- Alternatives be developed or evaluated that were not given serious consideration in the DEIS;
- Analyses presented in the DEIS be supplemented, modified, or improved;
- Factual corrections be made in information or data used in the analyses.

After reviewing these comments, the IDT and Forest management team agreed on changes that should be made in the FEIS. In some cases, the changes involved analysis methods and data common to all of the alternatives. Other changes involved considering alternatives not analyzed in the DEIS while dropping others that had been analyzed. The new alternatives were developed based on the public response to specific issues and the proposed resolution of these issues displayed in the DEIS. The new alternatives propose different land allocations, management prescriptions, and S&Gs from the set of alternatives analyzed in the DEIS as means of resolving issues.

The IDT updated or reanalyzed all of the alternatives considered in the FEIS. As a result, a new Preferred Alternative (PA) was identified: Alternative W. The Forest Plan was revised to reflect the proposed changes between Alternative J, the PA in the DEIS, and Alternative W. The Plan and the FEIS were submitted to the Regional Forester for review.

Following is a summary of revisions made between the DEIS and FEIS to respond to concerns raised during the public comment period.

Alternatives

- Alternatives B and J-Departure were dropped from the set of alternatives considered in detail. Both proposed a timber sale schedule that departed from long-term sustained yield capacity. Public responses were largely indifferent to the departure alternatives as a means of addressing the timber supply issue. Concerns were raised, however, about the environmental effects associated with the departure alternatives. Environmental effects of the departure alternatives were generally the most adverse of the range of alternatives considered in the DEIS (see Chapter IV, DEIS).
- Alternatives C and I were also dropped as alternatives considered in detail in the FEIS. While there was a moderate amount of favorable public comments on both of these alternatives, other alternatives were proposed and considered in the FEIS that address similar goals and objectives.

- Alternative K was added in response to public comments. Many individuals, as well as timber industry organizations, expressed a desire for an alternative that would maintain the timber harvest near the level in the current plan (1977). Although similar to Alternative I in the DEIS in some respects, differences in specific resource goals and objectives led to developing Alternative K. The Willamette Forestry Council (WFC) played a major role in advising on the development of Alternative K.

- Alternative L was also added in response to public comments that noncommodity uses of the Forest were not adequately represented in the alternatives in the DEIS. Many people were concerned that an alternative proposed by the Oregon Natural Resources Council (ONRC) for the DEIS was not fully analyzed. Alternative L was developed with suggestions from ONRC and affiliated groups.

- Alternative W (PA) was added to the set of alternatives largely in response to comments on Alternative J, the PA in the DEIS. Although the initial thought was to modify Alterative J in response to the criticism, it became apparent that the significance of the changes in specific resource practices as well as overall goals and objectives were as great as the differences between some of the alternatives considered in the DEIS. A new alternative was developed to help the public see and understand the differences.

Modeling and Technical Changes Common to All Alternatives

General

- The FORPLAN model used for DEIS analyses was a Forest-wide model in which similar lands were aggregated across the entire Forest. Reviewers of the DEIS commented that the Forest-wide analysis was not adequate to address critical issues such as water quality. In response to these concerns, a watershed specific FORPLAN model was developed and used in the analysis of alternatives in the FEIS. The revised FEIS model identified 33 major watersheds as the base geographical unit for aggregating similar lands.

- Because of the change in the model design, the way in which many of the resource prescriptions and requirements are modeled were also modified. Refer to Appendix B, *Description of the Analysis Process* for more details on these adjustments. Changes in the management direction or intent of the prescriptions are noted in the following pages.

Timber

- The timber inventory condition classes were updated for the acres of forest harvested or planned to be sold through September 1989. The acres of seedling and sapling stands destroyed in the Shady Beach Fire in September 1988 were also modified in the inventory to reflect the current condition.

- The starting timber yield tables were adjusted to show the expected volume per acre in 1994, approximately the midpoint of the planning period.

- The breakage and defect factors used to determine net volume in the timber yield tables were revised to better reflect the differences between stands of old, large trees and younger, smaller trees. In the DEIS a Forest-wide average for defect and breakage was applied to all condition classes regardless of size and age.

- Young stands in the Douglas-fir/western hemlock inventory component (the predominate timber component by acreage) between the age of 0-40 were stratified into four, 10-year age groups. In the DEIS these stands were combined into 2 groups.

- Old growth and large sawtimber condition classes were treated separately in the FORPLAN model rather than as a single group as was the case in the modeling for the DEIS.

- A prescription for a single application of fertilizer is available for all suitable acres that are predominately Douglas-fir. A maximum of approximately 450,000 acres additional acres were available for fertilization depending on lands available for timber management by alternative. In the DEIS fertilizer availability was limited to soil types that had been tested and shown positive results. A clarification of the Regional policy expanded the availability based on observed results over many soil types in Western Oregon.

- A standard was added to all alternatives that required directional felling of all large sawtimber and old-growth stands on slopes over 30% during harvest operations. This requirement was estimated to reduce volume lost to breakage by approximately 2% in large sawtimber and old-growth stands. The gain in net volume was included in the empirical yield tables.

- A prescription that allows a single, heavy commercial thinning entry as compared to two, lighter entries, was added to the set of prescriptions available in FORPLAN.

- Merchantable sawtimber volume from recent mortality in the empirical yield tables was included in the ASQ projections. This volume was not included in the empirical yield projections in the DEIS. Deductions for wildlife trees have been taken into account in determining this volume.

- The Pacific Northwest Region's *FEIS for Managing Competing and Unwanted Vegetation* was released after the Forest DEIS. Changes were made to management direction to be consistent with the guidelines presented in the FEIS and the intent of the mediated agreement.

Economics

- Timber values were updated to include the average value of stumpage harvested between 1977 and 1988.

- Costs used to determine the Forest budget by alternative were recalculated using the latest unit costs and were organized under the current accounting system.

Old Growth

- The mature and overmature survey (MOMS) of vegetation has been used to calculate acres of old-growth forests for display and analysis in the FEIS. The MOMS inventory utilizes photo-interpreted stand variables such as species, size, density, and stand structure to determine acres of old growth by various criteria. The timber inventory condition classes were used to estimate acres of old growth in the DEIS.

Wildlife

- The size and distribution of Spotted Owl Habitat Areas (SOHAs) were remapped to comply with S&Gs (S&Gs) selected in the Record of Decision for the *Final Supplement to the EIS for an Amendment to the Pacific Northwest Regional Guide, December 1988*. There are 59 SOHAs in the FEIS compared to 62 in the DEIS. The size of individual SOHAs increased from 1,000 to 1,500 acres. The tentatively suitable acres within SOHAs in the FEIS is 62,000 as compared to 46,400 in the DEIS.

- Mapping of the mature conifer habitat managed for wildlife species such as the pileated woodpecker and the marten was adjusted to account for the new distribution of SOHAs. The tentatively suitable acres in the management requirement network for these species in the FEIS is 19,133 as compared to 8,720 in the DEIS.

- Mapping of the mature conifer habitat for species represented by marten as the indicator species was extended to all elevations on the Forest. In the DEIS habitat was not identified and mapped at elevations below 4,000 feet on the southern end of the Forest.

- Big-game evaluations in the FEIS used *A Model to Evaluate Elk Habitat in Western Oregon*. This model incorporates the factors of cover, forage, and animal security to evaluate how well overall habitat conditions meet animal needs.

- Modeling of wildlife trees needed to provide habitat for primary cavity excavators was changed to ensure the management requirement level could be met in each individual stand and at the subdrainage level. Some alternatives have objectives higher than the management requirement. Timber volumes per acre were reduced by about 2 to 10% to reflect the number of trees necessary to provide the management requirement or habitat objectives of each alternative.

Soil and Water

- A data base error in interpreting unsuitable soils in the Soil Resource Inventory reduced the tentatively suited acres in the DEIS by 29,400. The error was corrected and the acres added to the tentatively suitable acres.

- Approximately 11,000 acres were removed from the tentatively suitable land base to meet the management requirements for riparian areas. The prescription for the management requirement level in the DEIS identified 21.5% of riparian acres for removal from the tentatively suited acres. In the DEIS these acres were assumed to occur only on other areas withdrawn from the suitable acres. After a reevaluation of original riparian inventory results, it was revealed that removing 21.5% of the acres evenly distributed across all riparian areas provided a more accurate model representation.

- As a result of public input and management concerns over watershed management and water quality, current practices (Best Management Practices, (BMPs)) designed to protect and enhance water quality are highlighted in the Forest-wide S&Gs in the Forest Plan, in FEIS Chapter IV, and in FEIS Appendix H. This appendix has been included as mitigation common to all alternatives, and as a response to input to the DEIS.

Rivers

- In October 1988, the Oregon Omnibus Rivers Act designated the North Fork of the Middle Fork of the Willamette and the Upper McKenzie rivers as Federal Wild and Scenic Rivers. Prescriptions for either Recreation or Scenic classifications are applied to these river segments in all alternatives.

- The Omnibus Rivers Act also directed that the South Fork of the McKenzie River and Blue River be studied for potential classification and eligibility as Wild and Scenic Rivers. Constraints applied in all alternatives protect the resource values of these rivers and along a 1/4-mile corridor on each side.

- Based on input to the DEIS, a Forest interdisciplinary river review team has evaluated 13 rivers across the Forest for eligibility under the Federal Wild and Scenic Rivers Act. As a result of this review, 10 rivers were identified as being eligible. Prescriptions that protect the outstanding resource values of elgible rivers and the 1/4-mile corridor on each side have been modeled in all alternatives.

Management Areas (MA)

- SOHAs and designated mature conifer habitat for pileated woodpecker and marten indicator species have been identified as individual MAs. In the DEIS these areas of reserved habitat were tracked in the mapping system but were not identified as MAs with individual prescriptions.

- An evaluation of certain prescriptions indicated similar management objectives and S&Gs that could be combined to simplify mapping and reduce repetition in the S&Gs. Consequently, the following MAs in the DEIS have been collapsed into single MAs in the FEIS: MA 4a and 4b, Research Natural Area; MA 5a and 5b, Special Interest Areas; MA 7a and 7b, Old-Growth Groves; MA 12a, b and c, Developed Recreation Areas; and MA 9a and b, Special Wildlife Habitats.

- Wild and Scenic Rivers MA 6 was expanded to MA 6a, Wild Rivers; MA 6b, Scenic Rivers; and MA 6c, Recreation Rivers to provide direction necessary to model designated and eligible rivers under the Federal Wild and Scenic Rivers Act.

- To better reflect management direction for the Hardesty Mountain area on the southwest side of the Forest, the following MAs were added in the FEIS: MA 5b, Hardesty Mountain Ecological Area; and MA 14b, General Forest-Deferred.

- MA 10f, Dispersed Recreation-Lakeside Zones was added. Many of the land allocations in this MAs were in MA 9c and d, Special Lakeside Habitats-Enhancement/Protection, in the DEIS. Since the management direction and objectives in MA 10f are similar to Draft MA 9c and d, these areas were included in the Final MA 10f.

- MA 15, Riparian Areas, was added. The prescription for this MA exceeds the management requirements for streamside management to meet water quality and is not used in all alternatives. Management requirement prescriptions for riparian areas are listed as Forest-wide S&Gs in Appendix D.

Changes Between DEIS Preferred Alternative (PA) (Alternative J) and FEIS PA (Alternative W)

- The FEIS PA recognizes riparian areas as an important feature in the forest landscape for a number of resources. Additional protection has been provided for these sensitive areas by allocating Class I, II, and III rivers and streams, wetlands, and lakeside areas to MA 15 with a prescription of no programmed timber harvest. The width of this no-harvest zone will be located after on the ground reconnaissance but in most cases ranges from 200-400 feet on Class I rivers to 75-150 on Class II and III streams.

- There is increased emphasis on watershed management and water quality. In addition to MA 15 direction, S&Gs have been added to provide protection for Class IV streams in moderately stable and potentially highly unstable soils. These S&Gs provide a no-harvest buffer of 25 to 100 feet to reduce risks of mass soil movement, maintain bank stability, and act as a source of large wood input to the stream channel for sediment control.

- The acres and rate of harvesting have been distributed by subdrainage to minimize potentially adverse effects of peak flow on stream channels.

- Objectives for elk management have been clarified as a result of mapping 212 emphasis areas across the Forest that specify a high, moderate, or low habitat objectives that are linked to a specific set of Forest-wide S&Gs.

- Management emphasis on cavity excavator habitat was reduced. The FEIS PA provides for maintaining 40% of the biological potential by subdrainage rather than 60% Forest-wide.

- A prescription was developed and used in the PA to provide for managed, mature conifer habitat required for pileated woodpecker and marten indicator species in MAs where rotations of 150-200 years were required to meet recreation and scenic objectives. This prescription applies to approximately 20% of the habitat areas for these species.

- Management practices that directly affect the diversity of plants and animals across the Forest have been addressed and a specific group of S&Gs, *Biological Diversity*, has been added to the Forest-wide S&Gs in the PA. This section also includes management direction for categorizing old-growth stands, reducing the rate of fragmentation of the landscape maintaining corridors of mature stands as links across the Forest, and providing large dead wood in all stands.

- Standards and guidelines have been added to MAs with rotation lengths of 150 years and longer to provide for the maintenance of structural features of old-growth stands which would provide old-growth habitat characteristics. Approximately 10 live overstory trees will be left along with down large wood and managed for a diverse species mix.

- Areas managed to protect visual quality were redefined to more closely reflect the areas that can actually be seen from major highway corridors (key viewing points). Overall, the acres allocated to a management emphasis of modification visual quality objective are approximately 77,000 acres less. Partial retention acres are 4,500 less and retention acres are 5,000 less in the FEIS PA than in the DEIS PA.

- More acres are allocated to MA 5a, Special Interest Areas (+9,257 acres); MA 7, Old Growth Groves (+917 acres); and MA 9a, Special Wildlife Habitats (19,988 acres); in the FEIS PA than in the EIS PA. The additional acres allocated to these MAs provide additional protection for special biological, cultural, or geological features that exist on the Forest.

ALTERNATIVE DEVELOPMENT AND ANALYSIS

The following sections describes how the overall themes and resource issues were identified and developed into a range of alternative land allocations and management direction responsive to NFMA, NEPA, and the public. Readers are encouraged to refer to Appendix B for a more complete and technical discussion of the development and analysis process.

Information on the amount and location of resources has been compiled through inventories of timber conditions, recreation use, wildlife populations, soil and water resources, and roads. These inventories were combined in the Geographical Mapping System (GMS) for use in the development and analysis of alternatives. This information was collected on a common map base, with different map layers developed for the various resources and inventory components. This step resulted in the identification of more than 65 layers of resource attributes and management opportunity delineations. This data base was updated between the DEIS and FEIS to reflect changes in land suitability, timber harvest and growth, and a revision of the spotted owl habitat network.

Alternative Development

The alternative formulation process began in November 1984 with a review of Forest issues, concerns, opportunities and resource inventories; resource production capabilities identified in the analysis of the management situation; and applicable planning direction. Based on a review of these items resource management options were developed for nine resource areas: Recreation; Fish and Wildlife; Timber; Range; Soil, Water, and Air; Minerals and Energy; Lands; Facilities; and Protection. Each option was comprised of management direction statements for the important factors for that resource. The resource management options were designed to incorporate issues, reflect a particular level of management emphasis, and serve as a potential building block for Forest management alternatives.

The draft resource management options were reviewed by the public during 1985, with the knowledge that the resource management options would be used as building blocks for alternatives. The public response was evaluated and the resource options were modified to reflect the public comments. The resulting options were used as building blocks in the development of preliminary alternatives.

A review of the options for the nine resource areas indicated that some resources relate primarily to the allocation of land and scheduling of timber harvests for achievement of their objectives (Timber, Recreation, and Fish and Wildlife), while other resources are primarily dependent on program budget and/or administrative action.

Since Timber, Recreation, and Fish and Wildlife are dependent on the allocation of land areas, actions emphasizing one of these resources has a direct effect on the others. The options for these resources were, therefore, compared to each other to determine their compatibility. Compatibility was judged by the Interdisciplinary Team based on the team's knowledge and experience. The six Recreation options, and seven Fish and Wildlife options were compared with each other and were compatible through all 42 possible combinations. These 42 options were then compared to the seven timber management options. Depending on the extent to which Recreation and Fish and Wildlife were emphasized, the timber options were compatible at some levels of production. This comparison resulted in 106 possible combinations of these three resources that could be compatible within an integrated alternative.

Since the range of management options for the resources included output levels close to the minimum and maximum benchmark levels, the preliminary alternatives formulated were by design within the range of benchmark levels, and spread throughout the entire range. Benchmarks are discussed in

additional detail later in this chapter. From these 106 conceivable alternatives, nine preliminary alternatives were identified, based on the following objectives:

- Minimizing the number of alternatives in an array that would still include all of the resource management options,
- Minimizing the duplication of resource options in the array, and
- Maximizing diversity in the mix of resource option combinations.

The resource options for Range; Soil, Water, and Air; Minerals and Energy; Lands; Facilities; and Fire Protection were then compared to the nine preliminary alternatives to determine their compatibility. Most of the options of these six resource areas were found to be compatible with the preliminary alternatives. Options for these resources were then incorporated into each preliminary alternative at a level consistent with the general emphasis of each alternative.

From the combinations of resource option descriptions nine preliminary alternative descriptions were written and rough estimates of some outputs were made. Two preliminary alternatives were dropped due to significant overlap and duplication. These seven alternatives were examined as to how well they resolved major facets of the Forest issues. In doing this the following factors were considered:

- Does the range of alternatives provide an appropriate magnitude of response to the issue?
- What other alternatives should there be?
- Are there inconsistent or incompatible items in the descriptions of the alternatives?

Two alternatives required by NFMA regulations, No Action, and one demonstrating ability to meet the goals of the Resource Planning Act (RPA), were added to the list for consideration at this time. Two additional variations on preliminary alternatives were developed which allowed for departure from long-term sustained yield. Due to significant overlap and duplication, three preliminary alternatives were dropped leaving eight alternatives in the DEIS. In June of 1987 a ninth alternative was included in the array of alternatives in response to decisions made regarding an appeal brought by the Northwest Forest Resources Council. The ninth alternative is referred to as the "No Change" (NC) alternative and is based on the potential yield of the Forest's 1977 Timber Management Plan.

During the review period for the DEIS, many comments were received indicating how well the public felt the key issues were addressed by the alternatives described above. A large number of the commentors expressed the opinion that not all reasonable and viable means of addressing the issues were considered (or at least considered in sufficient detail) in the DEIS. With the comments for direction, the Forest IDT and management team revisited the alternative formulation process used in the development of the DEIS as described previously. The resource options or the management prescriptions and the acre allocations were reviewed and revised. The result of the revisions were three additional alternatives in the FEIS that were not considered in the DEIS.

While developing these additional alternatives, the Forest staff and IDT contacted several groups and individuals that made specific comments concerning alternatives that were not adequately considered in the DEIS. The groups were contacted to clarify their concerns and to help the IDT develop and analyze alternatives that addressed these concerns. Alternative K and Alternative L were developed in this manner. In addition to individual contacts, planning newsletters were sent to all commentors providing them with updates on the development of Alternatives K, L, and W.

The identification of land areas which contribute to the goals and objectives of each alternative was an integral part of alternative development. Working from the management options identified earlier, areas of the Forest were identified as particular MAs and assigned the corresponding management strategy.

MAs are portions of the Forest managed for the same goals and objectives. They are physical units usually delineated on maps, and can be located on the ground. Examples include areas managed to provide specific types of wildlife habitat or particular levels of scenic quality, or intensive timber management. Management strategies (also called management prescriptions) are the direction for activities within MAs, and are detailed in the S&Gs that direct on the ground activities, including rates of timber harvest. A total of 38 management strategies were developed for use in the formulation of benchmarks and alternatives. These combinations of resource objectives were available to be assigned to specific locations on the Forest as necessary to meet the following criteria:

- Cost efficiency,
- Resource trade-offs,
- Resource quality and suitability,
- Planning direction, and
- Resolving issues.

Cost efficiency, which is a requirement of the NFMA regulations (36 CFR 219.12(f)(8)), has been defined as when outputs with assigned dollar values are produced according to their net economic value (i.e., benefits minus costs), or are achieved at specified levels in the least cost manner. For the most part analyses on the Forest consistently show this criterion to be met with the highest level of timber production feasible. Therefore, management strategies were assigned to minimize the impact on the suitable timber land base while still satisfying the other criteria outlined for the alternative.

In some cases resource trade-offs were a factor in addition to the economic trade-offs. Resource quality and suitability were related to the resource trade-offs considered. For example, attributes such as the size of a roadless area or the opportunity for solitude in a roadless area could influence the assignment of a roadless MA. Planning direction influenced MA assignment in some cases, particularly in the No Action and No Change alternatives. Requirements for the No Action and No Change alternatives mandated use of the land allocations in the current Forest Plan (1977) as a guide for MA assignment. Other direction, such as distribution criteria for spotted owl habitat areas, also influenced MA assignments.

The last criterion, issue resolution, had a direct influence on MA assignment in most alternatives. For example, the roadless area issue varies in intensity according to the particular area under consideration. Similarly, scenic corridors along roads are desired to a greater or lesser degree depending upon the emphasis of the alternative.

Data was then assembled and the MA boundaries used for the alternatives were selected. This process combined analysis and judgment to reflect the optimum assignment of MAs and strategies to meet the goals and objectives of the alternatives in both the DEIS and FEIS.

Between the DEIS and the FEIS several of the MAs used to develop the alternatives were also modified. The changes in the MA designations were applied to the alternatives developed since the DEIS

(Alternatives K, L, and W) as well as to the alternatives brought forward from the DEIS (Alternatives NC, A, J, and D). In general, these changes did not affect the goals and objectives of the MAs as described in the DEIS nor the outputs or effects associated with them. The MA changes were described in the section Changes Between Draft and Final.

A complete description of the management strategies for the entire set of MAs used in alternative development can be found in *Comparison of Alternatives, MAs*, later in this Chapter.

The next major phase of alternative development involved selection of silvicultural prescriptions to meet alternative objectives over the Forest and through time. Silvicultural prescriptions represent the potential sets of timber management activities that can be implemented on timber stands of different conditions, including precommercial thinning, fertilizing, commercial thinning and regeneration harvesting. Silvicultural prescriptions are selected in the FORPLAN model, which seeks to schedule activities in a cost-efficient manner. A total of four to eight silvicultural prescriptions were available for selection for each MA, depending upon stand condition. The extent to which FORPLAN selects timber harvest prescriptions determines the timber outputs for each alternative. The role and operation of FORPLAN in alternative development and analysis is described in the following section.

Alternative Analysis

Management prescriptions are sets of activities which represent a specific method of managing particular analysis areas. A group of these prescriptions cover the various ways that different analysis areas can be managed. These prescriptions provide choices which can be made in managing the land. To analyze and present these options, management prescriptions were defined for 15 MAs, each with specific resource objectives. Most analysis areas have the capability to meet the resource objectives of more than one MA. An estimate of economic costs and resource yields associated with the prescriptions was generated for use in the forest planning model (FORPLAN).

Management areas are described in detail at the beginning of Comparison of Alternatives.

Role of FORPLAN

FORPLAN (an acronym for FORest PLANning model) is a linear optimization model that was used to assist in the scheduling of silvicultural prescriptions in order to meet resource and economic objectives; and to assist in the analysis of how well the particular combination of land allocations, management strategies, and silvicultural prescriptions meet the objectives of each benchmark or alternative.

The Willamette FORPLAN model was based on Version 2, with updates designed to assist the interdisciplinary planning team analyze the economic and production trade-offs associated with the recreation, timber, scenery, old-growth, water, roadless, and wildlife resources, and to assist evaluate the extent to which various alternative management scenarios were able to address and resolve the identified public issues.

The FORPLAN model uses analysis areas as the basic building blocks for scheduling silvicultural prescriptions to meet economic and resource objectives. The analysis areas were developed in a two stage process. In the final FORPLAN model areas were first identified with relatively homogeneous characteristics in terms of watershed, silvicultural suitability, timber type (i.e., species group), and timber size class. These delineations were intended to capture the significant social, biological, physical, and economic differences in the way the land responds to alternative management strategies.

The second step was to assign the appropriate management strategy for each analysis area depending on its location, and the resource objectives of a particular benchmark analysis or alternative. A total of 883 preliminary analysis areas were used in the final FORPLAN model. These analysis areas were then combined with the management strategies and processed using a relational data base to reduce the number of unique combinations of analysis areas and management strategies to between 1500 and 2400, depending on the alternative. For a more complete description of the combination collapsing strategies refer to Appendix B.

The scheduling of silvicultural prescriptions is controlled by the management strategy constraints, and the objective function.

Management strategies are represented in the model as constraints on the amount of timber harvest prescriptions which can be selected within analysis areas of a particular MA. For example, where the management strategy is for intensive timber management (such as in the general forest MA), there are no constraints on silvicultural options FORPLAN can choose from. Where the management strategy is to maintain the scenic quality at high levels by retaining the natural appearance of an area (scenic retention MA), the rate of timber harvest allowed within the MA was constrained to less than full yield.

Constraints were applied at two basic levels in FORPLAN. At the broadest level, constraints were applied Forest-wide (e.g., nondeclining yield of timber). At the second level, constraints were applied to a grouping of analysis areas which were included within a particular management strategy. At the third level, constraints were applied to individual analysis areas (e.g., dispersion of timber harvest units). Only the silvicultural prescriptions and timing choices available for a particular analysis area and management strategy could contribute to this type of constraint. FORPLAN could then select and schedule specific silvicultural prescriptions and practices to maximize PNV while meeting all of the objectives for a particular alternative.

In the DEIS FORPLAN model some constraints were applied to specific analysis areas. In the FEIS model the amount of detail included in each analysis area was greatly expanded. Any constraints that may have been applied to a specific analysis area in the DEIS were redesigned to apply to similar grouping of analysis areas in the FEIS.

Constraints were designed to guarantee the spatial and temporal feasibility of land allocation and harvest scheduling choices in order to achieve the multiple-use objectives of a benchmark or alternative. Once the model determined that a feasible solution existed by satisfying all of the constraints, it searched for the set of silvicultural prescriptions and timing choices which permitted it to optimize the solution according to the specified objective function.

The objective function is a mathematical equation which shows how the Forest's objective (maximize PNV for example) is affected by the values explicitly portrayed in the silvicultural prescriptions available for selection.

Two different objective functions were used to drive the Willamette FORPLAN model, these being to maximize PNV and to maximize timber volume. Although there were some differences in scheduling patterns between the two, both resulted in the model harvesting timber within the limitations imposed by the constraints. All final FORPLAN runs for all the alternatives, except the No Change alternative, were made with a timber volume objective function. FORPLAN was not used to analyze the No Change alternative as it was based on a different set of assumptions and mapping.

Other Analysis Tools

Although FORPLAN was the central model in the analysis process, several other models were essential to either prepare data for FORPLAN, or help interpret FORPLAN results. Construction of managed timber yield tables for use in FORPLAN required use of computerized growth models.

The Douglas-fir Simulator (DFSIM), a growth and yield model, was used to simulate a wide variety of growth and harvest patterns over time for the Douglas-fir and Douglas-fir/true fir managed yield tables (Curtis, 1981). With DFSIM, the user can simulate yield regimes for Douglas-fir under different regeneration options (planted or natural), with or without precommercial thinning (PCT), and with or without fertilization. For a given set of investments, the goal was to find the combination of intermediate harvest and final harvest that best met the objective of maximizing volume or PNV (PNV). To search for the combination of thinnings and final harvest over different rotation ages that best met the objective and constraint set would require a great number of DFSIM runs. Dynamic programming was used in conjunction with DFSIM (DP-DFSIM) to automate the search for yield regimes in DFSIM that optimized either volume or PNV. Yield tables were developed to represent each objective for a range of management intensities from "natural regeneration with no intermediate treatments" to "planting genetically improved stock with full stocking level control plus fertilization."

Managed yield tables for other timber types (true fir and mountain hemlock) were developed with the PROGNOSIS model. PROGNOSIS is similar to DFSIM but does not have the dynamic programming option associated with it.

IMPLAN is a Forest Service designed computer model that estimates the expected economic effects of implementing one or more alternatives. IMPLAN is a computer-based system that is based on economic Input/Output (I/O) models. IMPLAN contains national economic data that have been organized into a single predictive model. The basis for prediction can be any single U.S. county or group of counties, any state or states, or the entire nation. Regardless of how the model is constructed (county or multiples of counties), IMPLAN provides a detailed description of the economy in question. The model then provides analytical information about the industries that are present and their relationship to other industries. Thus, changes in any of the industries, as caused by the alternatives, result in measurable changes in the socioeconomic area of influence. The economic effects estimated with IMPLAN are described by parameters typical of input/output studies. They are structural in nature, permitting multiplier effects to be traced throughout the various regional sectors. Direct, indirect, and induced changes in gross outputs, employment, income, and value added are the most representative account of potential regional economic responses. This information was used to portray the Forest Service's relationship to the area economy and to help assess the effects on that economy of alternative management programs.

Other models were designed to provide input to the FORPLAN model, and to analyze the effects of the alternatives on various resources. The VISPLAN model was used to reduce the complexity of the linear programming task while correctly displaying the effects of timber harvest from the management strategies that were limited to 12% or less final harvest per 10-year period. This model was an integral part of the process used to collapse the number of analysis areas, and is described in Appendix B.

A Spatial Disaggregation Process model was used to determine the acres of timber harvest compatible with meeting resource objectives at the subdrainage scale, and to provide FORPLAN constraints for alternative W, increasing the accuracy of FORPLAN estimates of resource outputs.

An economic spreadsheet was used to fully calculate PNV, costs, benefits, and associated measures such as net cash flow.

A recreation model was developed to calculate the effects of the alternatives on recreation visits in each of the Recreation Opportunity Spectrum Classes. A model was set up to estimate the effects of the alternatives on each of the roadless areas. A model was used to assess the effects of various harvest rates on stream conditions and water quality. Several wildlife models were constructed to further interpret FORPLAN results to estimate effects on animal populations. And a transportation model was used to disaggregate FORPLAN timber volumes to areas served by road systems for estimation of road mileages needed for a particular alternative.

Additional computerized methods were used to assess the effects of alternatives on the major resources. These analysis were based on models which are described in more detail in Appendix B.

Management Requirements

The implementing regulations for the National Forest Management Act contain basic direction for ensuring long term productivity of all forest resources (36 CFR 219.27). To assure consistency in interpreting and applying these requirements in forest planning, Regional direction established those requirements which must be met in all alternatives (internal memos dated 2/9/83, 4/16/84, and 8/4/86). These requirements are known as "management requirements" or MR's. In the DEIS they were called "minimum managemement requirements" (MMRs). All alternatives, except the No Change Alternative, comply with applicable laws and regulations. Additional discussion of the how alternative means of meeting MRs were analyzed is covered in Appendix G.

While numerous laws and regulations direct what must be considered in the planning process, the regulations pursuant to NFMA include detailed direction. Of these, four requirements have been analyzed because of the significant effects they have on management of Forest resources. These are:

- *Water Quality* - "Forest planning shall provide for compliance with the requirements of the Clean Water Act, Safe Drinking Water Act, and all substantive and procedural requirements of Federal, State and local governmental bodies with respect to the provision of public water systems and the disposal of waste water" (36 CFR 219.23(d)).

- *Riparian Areas* - Special attention will be given to land and vegetation for approximately 100 feet from the edges of all perennial streams, lakes, and other bodies of water...No management practices causing detrimental changes in water temperatures or chemical composition, blockages of water courses, or deposits of sediments shall be permitted within these areas which seriously and adversely affect water conditions or fish habitat" (36 CFR 219.27(e)).

- *Fish and Wildlife* - "Fish and wildlife habitats shall be managed to maintain viable populations of existing native and desired nonnative vertebrate species in the planning area...In order to insure that viable populations will be maintained, habitat must be provided to support, at least, minimum numbers of reproductive individuals and that habitat must be well-distributed so that those individuals can interact with others in the planning area" (36 CFR 219.19).

- *Timber Harvest Dispersion* - When openings are created by the application of even-aged silviculture, individual cuts shall conform to the Regional Guide direction on the dispersion of openings and maximum size limits for areas to be cut in one harvest operation (with some exceptions)(36 CFR 219.27(d)).

Techniques for meeting riparian requirements addressed the need to maintain bank stability and water temperature. The primary methods used were reservation from timber harvest on approximately 20%

of the riparian area which was assessed as inoperable for timber harvest, and reduced harvest rates (extended rotations) on the remaining riparian areas. Another important component of meeting the riparian and water quality requirements are the S&Gs which require implementation of Best Management Practices to control on-the-ground activities. These S&Gs ensure maintenance of viable fish populations including management indicator species of anadromous and resident salmonids.

Wildlife populations were maintained by establishing management indicator species and by providing habitat necessary to ensure continued viability of these species. Dedicated habitats with no timber harvest were provided for the spotted owl, pileated woodpecker, marten, bald eagle, and peregrine falcon. Options were provided for managing marten, pileated woodpecker, and bald eagle habitat. Harvest rotations longer than 150 years were required to provide habitat suitable for reproduction, but younger managed stands would provide habitat for dispersal, roosting, and foraging. Additionally, S&Gs ensure that primary cavity excavator populations will be maintained at or above 20% of biological potential, dead and down woody debris will be maintained in harvested areas, and that unique habitats will be maintained (e.g., cliffs, caves, talus, and meadows).

Timber harvest dispersion was ensured by limiting harvest rates within timber inventory components and within watersheds.

Alternative methods of meeting these requirements were evaluated in the Analysis of the Management Situation (AMS), and in subsequent analysis. During the AMS the impacts of the MRs on timber volume and PNV (PNV) were assessed. Several FORPLAN runs were made with different MR constraints present so that the impacts of the requirements could be determined. These runs evaluated the decreases in volume and PNV as a single MR was added to the base PNV benchmark which had no MR constraints. After the modelling changes for the FEIS were made, the consequences of the MR constraints were again tested. At this stage the effects of the MRs on PNV and timber volume were evaluated by testing how much timber volume and PNV increased as each MR was removed, when compared with a PNV benchmark run which included all the MRs.

Table II-1 shows the results of these runs. Comparisons in this narrative will be in terms of the change in PNV (PNV). Timber volume trade-offs in cubic feet can be determined from the table.

The most significant MR, in terms of effects on PNV, is the spotted owl habitat area requirement (12 % reduction). Riparian area requirements reduce PNV by 3%, mature timber requirements (for the pileated woodpecker and the pine marten) reduce PNV by 3%, and harvest dispersion requirements lower PNV by 6%. The sum of these reductions is 24%. Results of comparisons looking at individual MRs represent the maximum effect of that constraint since the linear program did not have an opportunity to consider any overlapping or interactive effects of more than one MR constraint in its optimization procedures. In the context of a particular alternative, however, the presence of all MR constraints plus additional constraints, allows additional overlapping of constraints and hence lessens the effect of MRs on PNV. Appendix G presents the results of analysis that tests the sensitivity of ASQ and PNV to the management requirements with significant effects.

Table II-1. Minimum Management Requirements - Effects on PNV and Timber Harvest

	LTSY [1]		1st Decade ASQ [1]		PNV [1]		
Description	**MMCF**	**Percent Change**	**MMCF**	**Percent Change**	**$MM**	**Percent Change**	**Comments**
Maximum PNV W/ all MRs	120.2	--	117.3	--	$3,782	--	This benchmark is the basis for comparison.
Dispersion MR	120.4	(+0.2)	119.0	(1.4)	$3,994	(5.6)	Not modeling dispersion allows harvest rates to exceed 25-30 percent of a watershed per decade.
Mature Timber [2]	123.0	(+2.3)	120.5	(2.7)	$3,908	(3.3)	Not modeling this MR adds 18,880 acres to timber production.
Riparian MR	124.0	(+3.2)	121.7	(1.2)	$3,901	(3.1)	Removing this MR adds 11,123 no harvest and 42,742 reduced harvest acres into full yield timber harvest.
Spotted Owl	130.2	(+8.3)	128.2	(9.3)	$4,237	(12.0)	Not modeling this MR adds 70,339 acres to timber production.
TOTAL		(14.0)		(14.6)		(24.0)	
Maximum PNV without MRs[2]	132.5	(N/A)	129.6	(N/A)	$6,073	(N/A)	This data is included as a reference to the DEIS. The percent change information is not valid because many coefficients have changed between the DEIS and FEIS.

[1] These effects are maximum estimates based on benchmarks. Actual opportunity costs are less when MRs are needed in part or totally to meet a resource objective in one or more of the alternatives.
[2] Mature conifer habitat areas for pileated woodpecker and marten.
[3] The maximum PNV without MRs benchmark was not re-calculated using FORPLAN. The information used here is from the DEIS.

Development and Use of Benchmarks

The primary analysis prior to the development of alternatives was the Analysis of the Management Situation (AMS). A comprehensive analysis of resource and economic production capabilities is required in the Analysis of the Management Situation. This was accomplished through individual resource supply and demand assessments, and through FORPLAN computer runs known as benchmarks. The purpose of benchmark analysis was to provide information on:

- The economic implications of complying with legal and policy constraints, including management requirements of 36 CFR 219.27;
- The effects of modeling assumptions;
- The schedule of management activities, resource outputs, effects, costs and PNV (PNV) associated with a single resource or an economic emphasis of individual benchmarks;
- The potential to resolve issues and concerns;
- The need to change current management direction; and
- The range within which integrated alternatives could be developed.

All benchmarks developed in this analysis were designed to be approximately implementable and were not constrained by budgets, except the No Change Benchmark.

All of the benchmarks originally evaluated included provisions to meet the management requirements of 36 CFR 219.27. These included protecting land and resource productivity, meeting air and water quality standards, and maintaining viable populations of fish and wildlife species. The previous section on Management Requirements describes these requirements in detail and presents the opportunity costs of meeting these requirements. Additionally, the results of one benchmark that does not include these provisions is presented in this section.

In addition to the major benchmarks displayed in this section and the analysis of management requirements, analysis was conducted to assess the opportunity costs and resource trade-offs associated with timber harvest policy requirements and economic assumptions. The analysis process and results are explained further in Appendix B. The AMS document, available in the Forest planning records, contains detailed resource supply and demand assessments. Summaries of these assessments are in Chapter III, The Affected Environment.

The analyses described above, in conjunction with the major benchmarks, laid the groundwork for development of the alternatives. The major benchmarks used to facilitate development of DEIS alternative included:

- Minimum Level
- Maximum PNV Based on Established Market Prices
- Maximum PNV Including Assigned Values
- No Action

- Maximum Resource Levels

Changes in FORPLAN model and related yield tables in response to comments on the DEIS would result in different output levels of the major benchmarks. The impact of these changes would be similiar for all benchmarks. The relative effects would be minor. In order to establish a means of estimating the relative affect of the changes on any particular benchmark, the maximum timber and maximum PNV benchmarks were re-analyzed using the FEIS FORPLAN formulation. This revised benchmark analysis can be used to assess the changes in the decision space of the alternatives which can be attributed to changes in the model structure.

A summary of the major results from these benchmarks is contained in Table II-2. A detailed explanation of the benchmarks and the results of the analyses is contained in Appendix B. The analysis of benchmarks provided valuable information about different ways of responding to public issues and management concerns. The maximum and minimum resource levels define the outer bounds, or "decision space," within which integrated alternatives were developed. Relationships among resources and relative trade-offs between resources were also made apparent.

Several of the benchmarks provided the basis for development of a developed alternative as described in the next section, Range of Alternatives.

Table II-2. Outputs, Effects, Activities, and Costs for Benchmarks

Output, Effect, Activity, or Cost	Unit of Measure	Minimum Level	Maximum PNV (Market)[1]	Maximum PNV (Assigned)	Maximum PNV (Assigned) Without MRs	No Action[1]	Maximum Timber[1]	Maximum Recreation
Developed Recreation Use	MRVDs	0	**1,774**	1,774	1,774	***,*****	**1,002**	1,872
Nonwilderness Dispersed Recreation Use								
Semiprimitive Nonmotorized	MRVDs	88	**0**	1	1	**50**	**0**	58
Semiprimitive Motorized	MRVDs	70	**13**	7	7	**49**	**13**	62
Roaded Natural	MRVDs	147	**0**	1	1	**1278**	**0**	686
Roaded Modified	MRVDs	254	**2142**	753	753	**376**	**2142**	340
Wilderness Recreation Use	MRVDs	126	**369**	255	255	**352**	**369**	246
Spotted Owl Habitat Areas	Number	152	**59**	78	16	**59**	**59**	78
Visual Quality Objectives								
Preservation	M Acres	744	**389**	389	389	**547**	**389**	686
Retention	M Acres	308	**0**	0	0	**78**	**0**	402
Partial Retention	M Acres	222	**4**	4	4	**150**	**2**	4
Modification	M Acres	402	**0**	0	0	**5**	**0**	565
Maximum Modification	M Acres	0	**1,283**	1,283	1,283	**895**	**1,285**	15
Allowable Sale Quantity	MMBF	0	**667**	660	746	**608**	**654**	102
Allowable Sale Quantity	MMCF	0	**117**	113	130	**110**	**118**	18
Fuelwood	M Cords	0	**59**	60	69	**54**	**59**	10
Long-Term Sustained Yield **	MMCF	0	**120**	123	133	**113**	**126**	88
Total Budget	Million $	3.7	**61**	41	47	**58**	**63**	10
Returns to Government	Million $	0	**146**	130	150	**120**	**135**	20
Payments to Counties	Million $	0	**37**	33	38	**30**	**34**	5
PNV	Billion $	0.86	**2.38**	5.09	6.07	**3.18**	**3.48**	2.72

[1]This alternative was recalculated using all of the changes in assumptions and data from the FEIS. The mix of DEIS and FEIS benchmarks is intended to help the reader understand changes that have occured since the DEIS was written.

Range of Alternatives

The range of alternatives considered in this FEIS is represented by the seven fully analyzed alternatives which span the range of issues and opportunities identified in the benchmarks analysis, in the DEIS, and in response to comments on the DEIS.
In the FEIS several new alternatives were developed in response to public comments on the DEIS. A large number of the commentors expressed the opinion that not all reasonable and viable means of addressing the issues were considered, and that other combinations of the resource options should be considered. As a result some of the resource options, management prescriptions, or land allocations were revised, and three additional alternatives were considered in the FEIS.

Additional information on the process used to develop the alternatives is found in the section on Development of alternatives in this chapter.

Several of the alternatives are required by regulation, or regional and national direction. The required alternatives and others developed for display in the FEIS are summarized here. Alternatives eliminated from further detail in the FEIS are summarized in the next section.

Required Alternatives

No Change: This is the No Change Alternative required by Regional and National direction in response to decisions made regarding an appeal brought by the Northwest Forest Resources Council. This alternative would: (1) continue the management of the Forest as defined by existing direction in the Forest's Multiple Use Land Management and Timber Management Plan; (2) maintain timber outputs equivalent to the potential yield of the 1977 Timber Management Plan and to the extent possible produce current levels and mixes of other resource outputs; and (3) continue existing policies, standards and management guidelines; although, *it does not incorporate management requirements directed by NFMA.*

Alternative NC is the No Change Alternative.

No Action: This alternative is required by the Council on Environmental Quality (CEQ) regulations for NEPA (40 CFR 1502.14), and by the NFMA regulations (36 CFR 219.12(f)(7)). This alternative would: (1) continue the management of the Forest as defined by existing direction in approved management plans; (2) continue existing policies, standards, and guidelines; (3) update the current budget to reflect changing costs over time; and (4) to the extent possible, produce current levels and mixes of resource outputs. *Management requirements are incorporated in this alternative.*

Alternative A is the No Action Alternative.

Emphasis on the Current RPA Program: This alternative will determine how the timber targets of the current (1980) RPA Program, which were distributed to the Forests through the Regional Guide, can best be achieved.

Alternative B-Departure is the alternative designed to achieve the Forest RPA targets. Alternative B was analyzed in detail in the DEIS. After a review of public comments on the DEIS and consideration of adverse environmental effects of departure alternatives considered in the DEIS, this alternative was not re-analyzed and considered in detail in the FEIS. The analysis and comparisons in Chapters II and IV of the DEIS remain valid and provide information on trade-offs and management implications

of meeting the 1980 RPA timber targets. Other activity and output targets assigned to the Forest in RPA will be achieved in this or one of the other alternatives.

Emphasis on Market Opportunities: This alternative emphasizes resources that have an established market price. Timber production is the major market commodity on the Forest and is emphasized in this alternative. Management for other resources would be at economically and environmentally feasible levels consistent with the emphasis on timber outputs.

Alternative K emphasizes market opportunities on the Forest. In the DEIS, Alternative I was used to display this management option. Because of some similiarities with Alternative K, Alternative I was not considered in detail in the FEIS. See Chapter II of the DEIS for details on output levels and effects of Alternative I.

Emphasis on Nonmarket Opportunities: This alternative puts an emphasis on water, fish and wildlife, recreation, and other amenity values. Management for other resources would be at economically and environmentally feasible levels consistent with the emphasis on amenity values.

Alternative L emphasizes nonmarket opportunities, particularly those related to old-growth preservation, wilderness, dispersed recreation and watershed management. Alternative D provides an emphasis on wildlife values. In the DEIS Alternative C was used to display nonmarket emphasis. Because of similarities with Alternatives D and L, Alternative C was not considered in detail in the FEIS. See Chapter II of DEIS for details on output levels and effects of Alternative C.

Departure Alternatives: In the DEIS, several alternatives incorporated departures from the nondeclining yield policy for timber production. This means that timber harvest schedules were modified to provide more timber in the earlier decades of the planning horizon but less in some of the later periods. The nondeclining yield policy requires harvest levels to remain constant or increase over time.

Two alternatives displayed in the DEIS represented departures from nondeclining yield. As discussed previously, a departure was necessary to meet the RPA timber targets in Alternative B. A departure schedule for Alternative J, the DEIS Preferred Alternative, was also developed to meet the expected future needs of the local timber industry as reflected in the Forestry Program for Oregon and supplemented by additional information from the State Department of Forestry. Alternative J-Departure also analyzed the effects of a departure on forest age-class distribution and possible benefits to other multiple use objectives.

Alternative J-Departure was not re-analyzed and consider in detail in the FEIS because public comments indicated it was not a desireable option for addressing timber supply concerns and that the environmental effects of the accelerated harvest were adverse and did not address other resource concerns. A departure of Alternative W, the FEIS Preferred Alternative, was not considered in the FEIS. Based on a comparison of issues addressed in Alternative J and W, and the effects of Alternative J-Departure displayed in the DEIS, the IDT determined that a departure sale schedule could not be developed for Alternative W that would attain the overall multiple use objectives of the alternative.

Additional harvest scheduling options were also considered for Alternative J in the DEIS that would allow for a smooth transition from current timber program levels to those proposed in the DEIS. These options were not displayed or re-analyzed in the FEIS.

All of the alternatives analyzed in the DEIS as well as the 3 additional alternatives developed for the FEIS in response to public comment were considered by the IDT to evaluate the range of alternatives. These 12 alternatives were evaluated to see how well they were distributed between the maximum

and minimum potentials for resources, if they provided an adequate comparison of resource trade-offs and if they were responsive to public issues and management concerns. As a result of this evaluation, the group of 12 alternatives was reduced to seven because of significant overlaps in one or more resource issues. The IDT also felt that the smaller set of alternatives would provided the FEIS reader with a clearer understanding of the resource issues and trade-offs involved.

Other Alternatives

Additional alternatives were developed by the Forest in response to public issues and management concerns. These also respond to National Forest Management Act Regulations (36 CFR 219.12(f)(1)) which requires that alternatives "be distributed between the minimum resource potential and the maximum resource potential" (the decision space) in order to display the full range of resource outputs that can be produced. Alternatives D, J and W are analysed in this FEIS to provide a wide range of alternatives, and to represent different balances between amenity and commodity oriented issues.

Decision Space

The alternatives developed, except the No Change Alternative, for management of the Forest are designed to be fully implementable under the NFMA Regulations, and focus on the resolution of the identified public issues and management concerns. The limits and reference points identified in the benchmark analyses were used in constructing these alternatives.

The selected harvest system for alternatives in most areas is clear-cutting. In areas managed for scenic retention, partial retention, dispersed, motorized, and nonmotorized recreation both clear-cutting and uneven managed age harvest systems will be used.

In all alternatives the use of herbicides will follow the direction established in the selected alternative of the 1988 EIS on "Managing Competing and Unwanted Vegetation." and the mediated settlement.

All alternative have incorporated the S&Gs from the Regional Guide and the SEIS for spotted owls except the No Change Alternative.

All alternatives include mitigation as described in the following section on features common to all alternatives.

These alternatives assume that there are no budget constraints which result in foregoing economically efficient commodity production opportunities or stated mitigations.

Preferred Alternative

A Preferred Alternative has been identified from the array of alternatives presented in this FEIS. The Preferred Alternative and proposed action in this FEIS is Alternative W.

The Preferred Alternative has been identified after a comparison of the alternatives and consideration of their resource outputs, environmental consequences, implementation costs, and net public benefit.

Alternative W provides direction for management of the Forest to provide a sustainable level of commodity resources, while providing for a wide range of non-commodity uses of the Forest. Wildlife habitats for mature conifer management indicator species will be managed at minimum levels. River and stream corridors will be managed primarily to provide water quality, fish habitat, dispersal of interior wildlife species, and high quality recreation opportunities. Alternative W includes principles of maintaining

old-growth characteristics in areas managed for scenic retention and partial retention, and encourages the use of minimum fragmentation in timber sale design.

Alternative W was developed without budget constraints. The resource activities, effects and outputs displayed in a later section of this chapter, are based on the budget level which is also displayed. The effect of budget constraints on this alternative would vary according to if the constraint was applied uniformly across market and non-market resources or not. Budget constraints might reduce the level of market outputs, increase the effects of timber harvest on non-market resources, and reduce monitoring of the S&Gs.

Alternatives Eliminated from Detailed Study

This section presents alternatives which were considered, but subsequently eliminated from detailed study. This group of alternatives includes benchmarks, preliminary alternatives developed for the DEIS and several alternatives that were considered in detail in the DEIS but were eliminated from detailed study in the FEIS based on public comment on the DEIS and a reevaluation of how the alternatives considered addressed issues, concerns and opportunities.

Benchmarks

Benchmarks were developed as part of the Analysis of the Management Situation (AMS) and were designed to emphasize the production of individual resources, or to define the most cost-efficient combination of prescriptions and land allocations for management of the Forest under certain circumstances. Benchmarks serve as reference points for the purposes of defining the range within which integrated alternatives were developed (the decision space), and for estimating the effects of various objectives and assumptions.

All of the benchmarks discussed in Development and Use of Benchamrks were considered for use as alternatives. However, all but one were eliminated from detailed study. The No Action benchmark became Alternative A, the No Action Alternative. Although the other benchmarks were eliminated from further consideration for a variety of reasons, they were useful as starting points for development of particular alternatives. The minimum level and the maximum PNV benchmarks were used to assess economic efficiency and to determine the economic implications of various harvest scheduling options. The benchmarks to maximize timber and recreation helped to determine objective levels for these resources in various alternatives.

A variation of the No Action benchmark (No Action/Without MMRs) was developed to assess the ability of the Forest to produce goods and services under the land allocations and prescriptions contained in the 1977 Forest Land Management Plan, without including the management requirements of NFMA. Although all resources are addressed in the current plan, the lack of management requirements in this benchmark is contrary to existing law. This benchmark became the No Change alternative.

Other DEIS Alternatives

Several preliminary alternatives were developed for the DEIS to respond to a specific issue or to help provide a wide range of alternatives. These alternatives were developed to varying degrees ranging from formulating a general goal or theme, through analysis of FORPLAN results, but were not presented in detail in the DEIS.

An alternative was developed to provide timber volumes over the first 5 decades that would maintain a steady supply from all ownerships within the three-county area. Achieving this objective required a departure timber sale schedule for the Forest with volumes rising for the first 2 decades and then declining slightly in decades 3 through 5. This alternative was in response to concerns for a Forest timber sale level that would balance timber harvest from all ownerships to provide a stable supply of raw materials for the wood products industry. See Chapter III, Timber for further information on the projected timber supply from other than Forest lands. This alternative was eliminated from detailed study because other departure alternatives considered in detail addressed similiar concerns based on input from the State Department of Forestry through the Forestry Program for Oregon and the 1980 Resource Planning Assessment timber targets.

Another alternative considered, but not studied in detail in the DEIS had an objective to maximize timber management on the suitable timbered land remaining after most of the inventoried roadless lands were allocated to no-harvest allocations. A FORPLAN analysis of this alternative produced an ASQ of 97 MMCF (565 MMBF) annually on a suitable landbase of about 807,400 acres. Like the benchmarks, this information provided a reference point for considering the roadless and timber supply issues, but was not useful as an alternative since it did not adequately deal with many of the major issues on the Forest.

Several preliminary alternatives developed by the Forest for the DEIS, were designed to ensure that all of the issues were being addressed over a broad range of land allocations and management practices. Further evaluation of the entire set of alternatives indicated that several were redundant, did not propose significantly different ways of addressing key issues, and thus were subsequently dropped from further consideration in the DEIS.

During the development of alternatives for the DEIS, several public interest groups developed management proposals for specific areas of the Forest. Rather than develop these proposals as individual Forest-wide alternatives, they were incorporated into Forest-wide alternatives with compatible goals and objectives. The management proposals included in other alternatives involve the Three Creeks, South Fork McKenzie, Fall Creek, and Hardesty Mountain areas of the Forest.

During the development of alternatives for the DEIS, the Oregon Natural Resources Council (ONRC) submitted an alternative that they proposed be considered in detail in the DEIS. After a preliminary analysis of the alternative by the Forest IDT it was dropped from further detailed analysis and consideration. The reasons for not considering the alternative in detail in the DEIS were that it was judged to be outside the range of reasonable alternatives because it did not adequately address key issues such as timber harvests, many of the land allocations proposed in the ONRC alternative were included in other alternatives that were considered in detail, and recommendations within the proposal for additional wilderness designations were not consistent with the direction in the Oregon Wilderness Act of 1984. See Chapter II, Alternatives Considered But Eliminated From Detailed Study, ONRC alternative in the DEIS for further information on analysis and rationale for eliminating this alternative.

Based on comments received during the public review of the DEIS, the Forest reconsidered the rationale for excluding this alternative. After several meetings with ONRC to identify objectives of the alternative (including several modifications of the original ONRC proposal), the Forest developed an alternative in response to their input. Alternative L was the result of this effort and has been analyzed in detail in the FEIS. See the appropriate sections of Chapters II and IV of the FEIS for a complete description, display of outputs and discussion of the environmental effects of Alternative L.

Other Alternatives - FEIS

In response to public review of the DEIS, many comments spoke to alternatives that were either considered or not considered in the DEIS and how well the options for resolving key issues were addressed. In response to the public comments, three new alternatives were developed and considered in detail in the FEIS; Alternative K (developed with input from Willamette Forestry Council (WFC)), Alternative L (developed with input from ONRC), and Alternative W (developed by Forest in response to public comments on Alternative J). See appropriate sections of Chapters II and IV in FEIS for further information on these alternatives.

When these 3 new alternatives were added to the group of alternatives considered in detail in the DEIS, the overall range of responses to issues was similiar to the DEIS. Several of the alternatives considered in the DEIS did not significantly add to the range or were similiar in many respects to the new alternatives. As a result, the following alternatives were not reconsidered in detail in the FEIS; Alternative B-Departure, Alternative C, Alternative F and Alternative I.

Following is a brief summary of the goals and objectives considered in these alternatives. For a more thorough discussion, see Chapter II, Description of Alternatives in the DEIS.

Alternative B-Departure (RPA) The goal of this alternative is to meet the 1980 Resources Planning Act (RPA) Program timber production targets assigned to the Forest in the Regional Guide. Other activity and output targets assigned to the Forest in RPA will be achieved in this or one of the other alternatives.

The level of timber production assigned to the Forest in RPA averages approximately 870 million board feet annually for the 50 year planning period. This volume includes all merchantable timber sold by the forest. Translated in terms of allowable sale quantity (ASQ), or net green volume, the RPA target equals 695 million board feet (128 million cubic feet). This volume is higher than the maximum amount that can be produced on a sustained basis.

The land allocations and acres suitable for timber management in this alternative were similiar to Alternative I in the DEIS. Fish, wildlife, soil and water resources were managed to met management requirements as modelled in the DEIS. The ASQ of Alternative B was 715 MMBF, slightly above the the 1980 RPA target of 695 MMBF. Alternative I, with a nondeparture sale schedule and identical suitable land base had an ASQ of 619 MMBF, several million board feet below the RPA target. Alternative B addressed the major issue of timber supply and demonstrated the effects of meeting the 1980 RPA timber targets. Because of public comment on departures, failure to address other key issues, and overall adverse environmental effects, an alternative designed specifically to meet the RPA timber targets is not considered in detail in the FEIS.

Alternative C - Alternative C emphasized recreation, fish, wildlife, and maintenance of the natural attributes of the Forest. It is designed to provide high levels of recreation opportunities and high quality experiences. The full inventory of roadless areas is maintained in an undeveloped condition with an emphasis on semiprimitive nonmotorized activities. Future demand for developed recreation opportunities would be met. Opportunities for high quality Wilderness experiences would be provided by regulating use. An additional Wilderness is proposed.

All areas of special significance would be managed to protect and enhance desirable attributes. Scenery would be enhanced by managing all areas according to inventoried Visual Quality Objectives and by rehabilitating unacceptable modifications.

The quantity, quality, and diversity of plant and animal habitats would be maintained at high levels. Habitat would be provided for the full inventory of spotted owls. A large variety of allocations are used to protect the soil, water, and air resources of the Forest, well above the Management Requirements, and to retain large amounts of old-growth.

Timber management would be emphasized to the degree compatible with other resource objectives.

This alternative was not analyzed in the FEIS because it was adequately represented by the range of alternatives which were fully analyzed.

Alternative F - Alternative F emphasized a balance of timber production and amenity uses such that historic harvest levels (average of 607 MMBF annually, Timber Sale Program Quantity) are maintained to support the traditional economic base of local communities. Amenity resources would generally be provided at the highest level commensurate with meeting the timber volume objective.

Approximately 41% of the currently unroaded areas would be maintained in a roadless condition to provide semiprimitive recreation opportunities and retain old-growth. Additional old-growth would be maintained to accommodate 74% of inventoried spotted owl habitat areas. Scenery along roads, trails, and attractions would be managed at current levels.

Some user regulation would occur in Wilderness to provide a better experience and help maintain the resource. Additional developed recreation opportunities and service would be provided. Areas currently receiving special area designation would be protected. A moderate emphasis would be placed on soil and water improvements, and fish and wildlife habitat improvements. Fish and wildlife habitat, as well as soil and water resources, would be managed above Management Requirements.

This alternative was not analyzed in the FEIS because it was adequately represented by the range of alternatives which were fully analyzed.

Alternative I - Alternative I emphasized the production of timber. Most of the suitable timber land base is allocated to timber production. Less than 6% of the currently inventoried roadless lands would be kept undeveloped. Old-growth would be retained for wildlife Management Requirements, in areas where roadless recreation opportunities exist, and in timber production areas prior to initial harvest.

Developed recreation opportunities would be limited to sites currently receiving high use. Some protection of the visual resource would occur along major highway corridors. Fish and wildlife habitats, and soil and water resources would be managed to meet Management Requirements. A few areas of special significance would be managed as Special Interest Areas.

Even though these alternatives were not re-analyzed in the FEIS, the relative comparisons of outputs and environmental effects in Chapters II and IV of the DEIS are still valid and were useful in considering the range of options that exist for addressing key Forest issues.

The departure scenario for Alternative J, the Preferred Alternative in the DEIS, also was not considered in detail in the FEIS. There were few comments on this alternative from the public review and many of the comments that were received expressed reservations about the level of environmental impacts associated with a departure. A review of the environmental effects of the departure alternatives considered in the DEIS, Alternative J - Dep. and Alternative B, did indicate generally higher levels of adverse effects in comparison to the other alternatives. See Chapter IV, DEIS for further information. Because of the high level of environmental effects and relative low level of public input for depatures

as a means of addressing the timber supply issue, no departure alternatives were analyzed in detail in the FEIS. See Chapter II of DEIS for discussion of departure opportunities and effects on timber supply.

In addition to the WFC and ONRC input between the DEIS and FEIS on specific alternative proposals, the Sierra Club also proposed an alternative for the Forest. The objectives of the Sierra Club Family Multiple-Use Alternative were to:

- Maintain approximately 60,000 additional acres in roadless condition (as compared to Alternative J).

- Protect all of the remaining "Classic" and "Early Classic" old-growth that was in a timber harvest category in Alternative J. The best available estimate is 126,000 acres which would be removed from timber harvest.

- Minimize further fragmentation of the Forest by using a "triage" concept to identify areas already highly fragmented from those with more coniguity. Harvest opportunities would be emphasized in the fragmented areas.

- Provide a level of timber supply near the historical harvest level for the past 10 years or approximately 520 MMBF.

A preliminary analysis indicated that the timber harvest objective and the roadless and old-growth objectives could not be met simultaneously. Comparisons with DEIS data for Alternative J show an ASQ of about 440 MMBF for the proposed land allocations. Additional analysis of Alternative J and other alternatives for the FEIS indicate that a detailed analysis using the FEIS FORPLAN model would likely result in an even lower ASQ projection. A detailed analysis of the Sierra Club proposal would also be difficult due to lack of a common map to indicate where and more precisely how many "classic" and "early classic" old-growth stands were to be protected. The preliminary analysis was done by correlating narrative descriptions with available Forest data to the extent possible, but mapped information would be necessary for further analysis.

The Sierra Club alternative was not considered in detail in the FEIS for the following reasons:

- Many of the resource objectives proposed were similiar to or were included in other alternatives considered in detail; roadless recommendations - Alternatives D, and L; old-growth - Alternatives D and L; fragmentation - Alternative W; timber supply - Alternative W.

- The "triage" concept failed to produce enough additional timber harvest on the acres identified for high intensity timber management primarily because meeting management requirements for other resources such as wildlife, water and soils did not allow large increases in harvests from these areas. Without the ability of these areas to compensate for decreases due to additional roadless and old-growth protection, the objectives stated for the alternative were not possible.

ALTERNATIVES CONSIDERED IN DETAIL

Introduction

Seven alternatives are considered in detail, Alternatives NC, A, D, J, L, K, and W. These offer various views as to how the land and resources of the Forest could be managed. Each is a combination of land allocations, management practices, and activity schedules which, when implemented, would result in a unique combination of resource outputs and environmental consequences. Together, they present a broad range of possible management alternatives.

The significant land uses, environmental effects, and resource levels are presented by alternative and time period in later sections of this chapter. Chapter IV, Environmental Consequences, describes the causes and relationships of the resource levels and environmental effects in detail.

Features Common to All Alternatives

In this section the features common to all alternatives are described. These features are goals and program levels which are found in all alternatives; inventories and assumptions used in modelling; and mitigation measures which are required to meet Management Requirements. Features which are not included in the No Change Alternative are noted below.

Management activities in each alternative are subject to S&Gs needed to attain the objectives and desired future condition for the Forest and for specific MAs. These standards are often required to mitigate the effects of management activities. S&Gs common to all alternatives (except No Change) are included in Appendix D. Additional S&Gs which apply to the Preferred Alternative are included in the Forest Plan which accompanies this FEIS. Some of these S&Gs are adopted from the Regional Guide for the Pacific Northwest Region, and others were developed by the interdisciplinary team specifically to respond to conditions on the Forest. Mitigation measures listed below are representative of the major types of mitigation found in all of the alternatives. The degree to which they are implemented varies according to the goals and objectives of each alternative, and in accordance with specific site characteristics. In all cases, mitigation measures would be designed at the project level during plan implementation, to fit the site.

Mitigation measures serve to accomplish the following:

- Avoiding impact of an activity altogether by not taking a certain action or parts of an action,
- Minimizing impacts by limiting the degree or magnitude of the action and its implementation,
- Rectifying the impact by repairing, rehabilitating or restoring the affected environment,
- Reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action,
- Compensating for the impact by replacing or providing substitute resources or environments.

Timber

With the exception of the No Change Alternative, current information is used including the most recent timber inventory data and yield tables.

Areas which cannot be adequately restocked within 5 years, or with active land slides or risk of irreversible damage to soil and water resources, would be designated as unsuitable for timber production, and would have no programmed timber harvest.

The final determination of timber harvest method would be made on a site-specific level for each project. All alternatives would employ combinations of the silvicultural systems applicable on this Forest. Even-aged and uneven-aged systems, including clearcut, shelterwood, seed tree, single tree selection and group selection harvest methods are all available tools under each alternative. The S&Gs indicate the system generally appropriate for given combinations of site and stand conditions, and management goals and objectives. The FEIS, Appendix F presents a discussion of the various systems, comparisons of their effects, and rationale for uses under different conditions. The final selection of a silvicultural system for a specific site would be left for the silvicultural prescription. This is consistent with the Criterion 6 of Section I-1 of the S&Gs in the Regional Guide for the Pacific Northwest Region. (USDA 1984b).

Logging systems would also be matched to the site specific conditions, with systems selected to meet the resource objectives at the least cost. All systems would be available, including helicopter, and would be used where appropriate. The cost data used in the analysis includes allowances for this mix of logging systems in the timber program. Timber management intensities, which define the levels of practices such as fertilization, precommercial and commercial thinning, etc., were developed to portray different investment levels.

Pest Management

An integrated approach to pest management would be employed that incorporates the Pacific Northwest Region's FEIS for Managing Competing and Unwanted Vegetation. In implementing the Forest Plan through project activities, the Forest would comply with the Record of Decision issued by the Regional Forester dated December 8, 1988, and the Mediated Agreement of May, 1989. Use of all vegetation management techniques is allowed only when other methods are ineffective or would unreasonably increase project costs. Emphasis must be on prevention and early treatment of unwanted vegetation and full public involvement in all aspects of project planning and implementation. Monitoring and enforcement plans to implement specific methods would be developed for site-specific projects and described in the environmental analyses for these projects.

Wildlife

At least two potential nest sites would be managed to meet management requirements and the Pacific States Peregrine Falcon Recovery Plan.

All active bald eagle nest sites would be protected. Additional potential nest sites would be protected to meet the management requirement of 21 active and potential nest areas.

Except for the No Change Alternative, all of the S&Gs concerning Spotted Owl Habitat Areas are based on the direction in the Regional Guide. The Pacific Northwest Region's Final Supplemental Environmental Impact Statement (SEIS) considers a range of alternatives for spotted owl habitat management. The Preferred Alternative in the Final SEIS changed direction for spotted owl habitat management from that described in the Regional Guide. Appendix G displays the potential effects of this change on some of the alternatives described in this chapter.

Many mitigation measures are designed to maintain wildlife habitat. Some roads would be closed to protect threatened and endangered species habitat during critical periods such as the nesting and

breeding season for bald eagles. Access would be controlled to increase habitat effectiveness for deer and elk. The amount of roads with limited entry depend on the elk habitat objectives for the area. Dead, down and defective trees would be protected to meet or exceed management requirement habitat for primary cavity excavator species of birds. Habitat manipulation projects would be undertaken to improve habitat or mitigate habitat loss for wildlife species.

Fish

Increasing the passage of anadromous fish around reservoirs on and adjacent to the Forest would be encouraged by working in partnership with other Agencies, and the public. Rehabilitation and enhancement projects for anadromous fish habitat would be implemented where compatible with other land allocations. Fish population management objectives would be compatible with fish management goals of Oregon Department of Fish and Wildlife, and the Northwest Power Planning Council.

Riparian areas and fish habitat would be protected through mitigation measures which prevent disturbance to streams during spawning seasons, require directional felling of harvested timber, and suspension over stream channels during yarding. When catastrophic events occur, or when preventive measures are insufficient, riparian areas would be rehabilitated by planting grass and tree species with rapid growth characteristics, and by introducing boulders, gabions, or large woody debris.

High quality habitat would be provided for the Oregon Willamette Chub at Buckhead Wildlife Area and Shady Dell campground.

Soil and Water

Management activities in all alternatives would be governed by those S&Gs which include Best Management Practices (BMPs). BMPs are specifically designed to protect water quality, as required by Section 208 of the Clean Water Act. General BMPs would be selected and tailored for site-specific conditions to arrive at project-level BMPs for the protection of water quality. Best Management Practices used on the Forest would meet or exceed BMPs described by the Oregon Forest Practices Act. See BMP Appendix H for a discussion of the process and practices.

Many BMPs are routinely built into ground or vegetation disturbing projects (e.g., timber sales) in order to mitigate adverse effects on soil productivity and water quality. Preventative practices such as log yarding with the entire log or one end-suspended, and burning slash when soil and duff moisture contents are high, have been found to minimize soil erosion and productivity losses. Road construction, reconstruction, and maintenance practices also receive focused attention in project level planning and execution. Road drainage techniques, culvert design, and stream crossing structures are all designed to mitigate the impacts of the Forest road system.

The risk of adverse cumulative effects to water quality vary according to the effectiveness of the selected BMP's and the rates of timber harvest and road construction in subdrainages.

Wetlands and floodplains would be protected according to Executive Order 11990 and E.O.11988. The requirements of the Clean Water Act would also direct the management of wetlands.

Long term soil productivity would be maintained by implementing practices to maintain soil condition. Cost effective soil and water enhancement projects would be undertaken where compatible with other resource goals.

Wild and Scenic Rivers

Except for the No Change Alternative, all of the Alternatives provide for protection of outstandingly remarkable values of 2 designated Wild and Scenic study rivers and portions of 8 rivers determined eligibible for inclusion in the National Wild and Scenic Rivers system. Protection of river values for designated study and eligible rivers is afforded these rivers pending Congressional action or until river segments are determined unsuitable for inclusion into the National System.

Fire and Fuels

A full fire prevention program would be implemented. Three to five lookouts would be staffed. Aerial detection would be provided, as necessary and where cost-effective, after lightning storms and on high risk days. An initial attack program which emphasizes cost-effective presuppression and suppression, while minimizing resource loss would be provided.

Logging residue would be utilized for multiple purposes including nutrient recycling, wildlife habitat, fuelwood, and other commercial products, while achieving reforestation and air quality objectives. Prescribed burning would be limited to times and sites which do not impact high use areas of the Forest and nearby population centers.

The Forest would comply with daily smoke management instructions from the State Forestry Office to mitigate air quality impacts from slash burning. These instructions specify where and when burning is allowed. Other air quality mitigation measures include early and aggressive fire mop-up, increased utilization of logging residue, and public education.

Cultural Resources

Cultural resource management would be accomplished in accordance with appropriate laws, regulations, and policies for both historic and prehistoric properties, and to ensure the rights of Native Americans to practice their traditional religions.

Minerals and Energy

The amount of land available for entry by mineral and energy development would be directly related to the total acres of land in allocations which permit this activity. All energy related applications, notices of intent, or operating plans for locatable minerals would be responded to in a timely manner. Active permits and claims would be administered to established standards to minimize adverse impacts to surface resources. All anticipated major energy projects, mining opportunities and leases, and claims with potential for development would be identified.

Facilities

Utility transmission corridors are excluded from crossing the crest of the Cascades along much of the eastern boundary of the Forest because of designated Wilderness. There are five areas on the crest that are not Wilderness and which are therefore "windows" through which utility transmission corridors could possibly pass. These windows are the areas in the vicinity of Emigrant Pass, Willamette Pass, McKenzie Pass, Santiam Pass, and the North Fork of the Breitenbush River.

A number of avoidance areas would be important considerations in the evaluation of corridors through these windows. These considerations include scenic values, wildlife habitat requirements, and needs and values associated with developed downhill and cross-country ski areas.

If the need arises for utility transmission corridors on the Forest, their establishment and location would be determined through an evaluation of alternatives (including existing corridors), utilizing a project environmental analysis (NEPA) process, with inter-Forest and interagency coordination and involvement.

Roads

The miles of road constructed during the next decade would be in response to needs of the timber sale program for each alternative. Management of existing roads would be responsive to the management objectives of resources appropriate to the MA and alternative.

Lands

All existing special use permits would be administered to established standards. Necessary landline location would be done to support all resource programs. Investments in permanent markers would be maintained. Rights-of-way necessary to support revenue producing resources would be acquired. The desired land ownership pattern in the Forest Plan would be achieved with methods other than purchase.

Law Enforcement

A Forest Service law enforcement agent would make regular patrols in all areas of the Forest. Cases with some possibility of recovering costs would be investigated. Cooperative law enforcement agreements would provide regular weekend and holiday patrols at fee sites and other high use areas from the beginning of fishing season through the month of September. An aggressive cannabis (Marijuana) eradication program would also be maintained.

Firewood

The number of personal use firewood permits issued, amount available per permit, and cost of each would be evaluated and adjusted yearly, based on demand and the cost of administering the program. Firewood cutting areas would also be determined on an annual basis.

H.J. Andrews Experimental Forest

The H.J. Andrews Experimental Forest would be managed for research, according to the objectives of the coordinating agreement between the Pacific Northwest Research Station and the Forest.

Alternative Goals And Management Objectives

This section presents the goals and objectives of the seven alternatives.

Each alternative has a set of goals and output objectives. These are designed to respond to public issues and management concerns identified in Chapter I and Appendix A. Each alternative distributes the lands of the Forest to different MAs. Acreages assigned to different MAs vary from one alternative to another (Table II-3), Comparison of Alternatives). Locations of the MAs for each alternative are displayed on the maps which accompany this document. Descriptions of the MAs are presented in Comparison of Alternatives section in this Chapter.

ALTERNATIVE NC (No Change)

Goals and Background - The No Change (NC) Alternative represents implementation of the Forest's existing Land Management and Timber Management Plan to achieve timber production at potential yield levels.

The No Change Alternative has been developed in response to decisions made regarding Appeal Number 1588, brought by the Northwest Forest Resources Council on May 19, 1986. The appeal centered on a decision by Regional Forester James F. Torrence to "require inclusion of Minimum Management Requirements (MMRs) in the No Action Alternative for each Forest Plan." The substance of the appeal was that a "true No Action Alternative representing current management plans" was not included in the DEIS and is not included in the FEIS. In response to this, a No Change Alternative has been developed to represent the existing timber management plan, and consequently does not comply with all provisions of the National Forest Management Act (NFMA) and regulations promulgated by the Secretary of Agriculture to implement NFMA.

The following provisions of NFMA or other laws or regulations are not partially or fully complied with in the current management plan represented by the No Change Alternative:

> 36 CFR 219.14 - Timber resource land suitability: requires identification of lands not suited for timber production based on risk of irreversible resource damage, lack of assurance of reforestation within five years, or withdrawal by Act of Congress, Secretary of Agriculture, or Chief of Forest Service.
>
> 36 CFR 219.16 - Requires that all alternatives identify decadal timber harvest levels and long-term sustained yield levels, consistent with the requirements of the RPA program and Regional guide. Also specifies conditions under which departure from nondeclining flow will be considered.
>
> 36 CFR 219.18 - Requires that Wilderness management direction be provided, including actions needed to limit or distribute visitor use, and measures desirable to protect the Wilderness or adjacent areas from wildfire, insects or disease.
>
> 36 CFR 219.19 - Provides for viable populations of vertebrate wildlife species, the selection and monitoring of management indicator species, cooperation with wildlife management agencies, and protection of habitat critical to threatened or endangered species.
>
> 36 CFR 219.23 - Requires full consideration of water and soil resources including estimates of current water uses, instream flow requirements, protection of water quality, watershed condition, and protection of wetland and floodplain values.
>
> 36 CFR 219.27 - Identifies specific management requirements to be used in the development, analysis, approval, implementation, monitoring and evaluation of forest plans for activities including: silvicultural practices, resource protection, vegetative manipulation, protection of riparian areas, protection of soil and water, and maintenance of diversity.

The Multiple-Use Land and Timber Management Plan upon which the No Change Alternative is based was developed in 1977. The original plan was based on yield tables and resource relationships which do not reflect the latest scientific techniques and information and do not reflect the standards in the NFMA regulations. The timber management plan has been amended following Congressional designa-

tions (new Wilderness and Wilderness additions), but there has not been reconciliation of the timber management plan with unit plan direction and requirements of NFMA.

The difference in assumptions between the No Change Alternative and the other alternatives is of a magnitude such that some activities, costs, outputs, and effects could not be reasonably estimated or compared to other alternatives. These different assumptions include the following:

- Alternative NC includes 125,000 acres of "marginal" lands programmed at full yield. This results in a suited landbase of 1,064,616 acres. About 60% of the lands in the marginal category are considered unsuited by today's standards. The current plan proposed program recognized the difficulty of managing these lands by scheduling only 7% of the potential harvest on marginal soils, to provide research on management practices.

- Management Requirements are not provided in the No Change Alternative. The most significant requirements included in all other alternatives are providing for maintenance of viable fish and wildlife populations, and dispersion of timber harvest units.

- Timber yields were developed from a different timber inventory, used different growth and yield models, and were based on a different grouping of species and site indices. Fertilization was not included in yield tables for the No Change Alternative.

- Alternative NC uses commercial thinning volume to offset the shortage of mature timber available for harvest in the 6th and 8th decades. As many as six thinnings, spaced ten years apart, are prescribed for some stands with the total yield from commercial thinning accounting for half or more of the volume, thus allowing harvest levels to be maintained at the long term sustained yield capacity.

- Multiple resource objectives were not directly represented in the model used to calculate the potential yield for Alternative NC; areas like streamside zones and scenic corridors had reduced yields to represent these objectives.

These differences prevented use of the current Forest FORPLAN model to evaluate the No Change Alternative.

Recreation - The current mix of public and private sector management of developed sites would remain unchanged. A 108-day managed season for developed facilities would be in effect.

Semiprimitive motorized and nonmotorized dispersed recreation opportunities would be provided from several land allocations including the Waldo Lake Recreation Area and the Oregon Cascades Recreation Area (OCRA). The OCRA is managed to provide motorized use opportunities throughout the year.

Seventy percent of the Forest would be open to off-road vehicles (ORVs); 30% would be either closed or restricted to a specified season of use and/or type of vehicle.

Existing nonwilderness trails, totaling 714 miles, would be retained in this alternative; periodic trail reconstruction and regular maintenance would be done to keep the entire trail system to standard.

Increases in future use of Wilderness would be allowed up to user capacity of each Wilderness Resource Spectrum class MA. Trail maintenance, and resource protection and rehabilitation measures would be employed routinely. No additional trails would be constructed.

Nomination of sites to the National Register of Historic Places would be performed as necessary.

The natural and cultural characteristics of four areas (1,813 acres) in the Forest would be preserved as Special Interest Areas (SIAs) in this alternative. These are Monument Peak Botanical Area, Wolf Rock Geological Area, Lamb Butte Scenic Area, and Tumblebug Gorge Geological Area. In addition, this alternative designates 22 specimen old-growth timber groves, totaling 1,237 acres, to provide for recreational use, educational study, and aesthetic appreciation.

Roadless Lands - This alternative would maintain significant portions of 8 inventoried roadless areas and lesser amounts of other inventoried roadless areas in an undeveloped condition. The majority of the Mt. Hagan roadless area would be allocated to multiple-use management, including a Research Natural Area and timber harvest.

Visual Resources - This alternative emphasizes a high to moderate level of scenic quality within foreground zones of all State and Federal highways. The overall scenic quality of Forest viewshed corridors, however, would have a low to moderate emphasis in this alternative.

The foreground areas of all State and Federal highways, selected major Forest roads, and selected trails would be managed to ensure that landscape alterations are not evident from within the area (Visual Quality Objective (VQO) of Retention). In addition, the foreground areas of selected Forest roads and trails are managed to ensure that changes, while noticeable, remain subordinate to the character of the surrounding landscape (VQO of Partial Retention).

Portions of middleground view areas from State Highway 22 and State Highway 126 and from selected Forest roads, are managed to provide a landscape scene where alterations are subordinate to the character of the surrounding area (VQO of Partial Retention).

Old Growth - A minimum of approximately 260,000 acres of old growth (R-6 definition) would be maintained after fifty years in this alternative. These acres are in areas administratively and legislatively removed from development and lands unsuited for timber production. Additional old growth would be present in timber production areas for several decades.

Timber - Timber harvest would be scheduled on a suited landbase of 1,064,600 acres. Approximately 918,700 acres would be managed on rotations of less than 100 years, and 145,900 acres on rotation ages of 100 to 200 years. The Allowable Sale Quantity (ASQ) of 810 MMBF for the 1st decade would be about 30% higher than the average amount sold annually between 1977 and 1989.

Wildlife - Forest-wide, optimal thermal cover would be provided on at least a portion of deer and elk winter range during the first decade. Habitat capability would be provided for a potential population of 3720 elk and 18,600 deer for the first decade. This is the estimated existing population levels.

Twenty-one bald eagle sites would be provided including five active nest sites.

Natural openings would be maintained or enhanced whenever possible. Special attention would be given to the management of natural openings within MAs with timber harvest.

Fish - Improvements would be made on 1,335 acres of reservoirs for resident trout.

Water - Riparian areas would be managed at minimum levels for water quality protection. Water quality would reflect watershed conditions created by managment practices, particularly the cumulative conditions created by high levels of timber harvest and road construction.

Research Natural Areas - This alternative would provide for research needs and opportunities through six Research Natural Areas (RNAs). Of the six RNAs included in this alternative, four are established areas, and two are proposed new areas to meet research needs of the Pacific Northwest Research Natural Area Committee.

ALTERNATIVE K

Goal Statement - Alternative K represents a low emphasis on nonmarket values and a high emphasis on commodity production. The management philosophy of this alternative is one which emphasizes a public understanding of the practices which are undertaken to maximize production of market goods from the forest, under multiple-use principles. The focus is to maintain high levels of timber harvest by making most of the Forest's tentatively suited land available for timber production. The objective is to maintain a timber supply level equal to the historical levels. This Alternative was formulated with input from the Willamette Forestry Council (WFC).

Roadless areas not designated as Wilderness in the 1984 Oregon Wilderness Act would be managed for a variety of multiple use values including timber, except for Bull of the Woods Roadless Area. The visual quality objective would be to allow all types of management activities to be seen in all areas, but the activities would not dominate the views.

Developed recreation would be emphasized, with all existing and inventoried potential developed recreation sites being managed and protected. The Forest transportation system would increase, making larger areas accessible for motorized recreation.

An objective would be to maintain water quality by insuring strict adherence to operational Best Management Practices.

Recreation - Privately managed sites and all publicly managed sites would be maintained and enhanced to meet increased demand for developed site use. In addition, the conversion of old sites to their original form and use; the expansion of other existing sites to increase capacity and diversity of opportunities; and the development of new sites would be employed to meet anticipated increases in demand for developed site use. This alternative also proposes the development of interpretive centers along major travel corridors such as the I-5 route to promote and facilitate use of the Forest. A 108-day managed season for developed facilities would be in effect.

Semiprimitive dispersed recreation opportunities are provided in areas that are unsuitable for timber production. Semiprimitive motorized use opportunities are provided from seven seperate areas in the Forest. Semiprimitive nonmotorized recreation opportunities are provided from three areas. The Oregon Cascades Recreation Area (OCRA) would be managed to provide only nonmotorized use in this alternative except for over the snow use.

Sixty-three percent of the Forest would be open to off-road vehicles (ORVs), 7% restricted to a specific season of use and/or type of vehicle, and 30% closed to ORVs.

Existing nonwilderness trails, totaling 714 miles, would be retained in this alternative. Additional trails would be developed as needed to accomodate increased trail related use. Periodic trail reconstruction and regular maintenance would be done to keep the entire trail system to standard.

Management of Wilderness would be accomplished with current budget levels. Increases in future use would be limited to user capacity of each WRS class MA. Trail maintenance, and resource protection and rehabilitation measures would be employed. No additional trails would be constructed.

Nomination of sites to the National Register of Historic Places would be performed as necessary.

Nine areas (2,715) having significant characteristics as either scenic, geologic, botanic, historic, or archeologic Special Interest Areas are included in this alternative. A portion of the historic Central Oregon Military Wagon Road is also included. Also in this alternative, seven specimen old-growth timber groves, totaling 853 acres, are allocated to provide for recreational use, educational study, and aesthetic appreciation.

Roadless Lands - This alternative would maintain significant portions of two inventoried roadless areas in an undeveloped condition. The Mt. Hagan roadless area would be allocated to multiple-use management, including timber harvests in this alternative.

Visual Resources - The central theme of scenic resource management in this alternative is to facilitate visual awareness and understanding by the forest users of all components of Forest management through demonstration of forest management activities. The overall scenic quality of Forest viewshed corridors however have a low to moderate emphasis.

The foreground areas of all State and Federal highways would be managed to ensure that alterations, while noticeable from within, remain subordinate to the character of the surrounding landscape. In addition, the foreground areas of several Forest roads are managed to ensure that alterations, while dominate, possess characteristics of form, line, color, and texture that occur in the surrounding landscape. Management activities within middleground viewing areas of State and Federal highways would also appear dominate but possess attributes of the surrounding landscape.

Old Growth - A minimum of approximately 305,000 acres of old growth (R-6 definition) would be maintained after fifty years in this alternative. These acres are in areas administratively and legislatively removed from development, lands unsuited for timber production, and areas set aside for riparian and wildlife Management Requirements. Old growth would also be present in timber production areas to some extent for several decades.

Timber - Timber harvest would be scheduled on a suited landbase of 932,813 acres. Approximately 797,000 acres would be managed on rotations of less than 100 years, and 136,000 acres on rotation ages of 100 to 200 years. The alternative would achieve about 97% of the "Forestry Program for Oregon" target without departing from non-declining flow. The Allowable Sale Quantity (ASQ) of 650 MMBF for the 1st decade would be about 4% higher than the average amount sold annually between 1977 and 1989.

Wildlife - Bald eagle protection would be provided in 21 areas including five active nest sites. Active nest sites would have site specific management plans prepared, and 30 acres of old growth habitat would be allocated for each potential nest site. All area within 1.1 miles of eleven major water bodies would be considered potential locations for roost, forage, or nest sites.

Management Requirements for peregrine falcon would be met by protecting two potential nest sites.

Suitable habitat would be provided to meet Management Requirements for the northern spotted owl, pileated woodpecker, and marten. Forest-wide habitat networks would be established for each species. This includes 59 spotted owl habitat areas occupied by 60 verified pairs of spotted owls. Approximately

82,782 acres would be specifically dedicated to spotted owl habitat. The remaining spotted owl habitat consists of lands unsuited for timber production. Habitat capability for 35 pairs of spotted owls would be provided in wilderness areas, occupied by 15 verified pairs. Habitat areas managed on 150 year harvest rotations would provide additional suitable habitat for pileated woodpeckers and marten. These extended rotation areas would be distributed and maintained in a pattern meeting Management Requirements for these species.

Effective habitat for deer and elk would be provided by designating High, Moderate, or Low Emphais Areas. Winter range would be 11% high emphasis, 34% moderate emphasis, and 55% low emphasis. Forest-wide, optimal thermal cover would be provided wherever old growth habitat and no harvest allocations overlap. Habitat capability would be provided for a potential population 3720 elk and 17,762 deer, through the first decade.

Created openings contiguous to meadows, talus, cliffs, and caves would not exceed one-third the size of the natural opening perimeter.

Dead and defective tree habitat needed to meet the Management Requirements for primary cavity excavating birds would be provided. Habitat would be distributed to provide for 40% of the potential population forest-wide. Individual harvest units would be managed for 20% potential populations. A minimum of two logs per acre of would be left as large down woody material on at least 10 % of the harvested acres.

Habitat improvement projects would be planned in conjunction with timber sales. Projects would emphasize snag creation, access management, and forage enhancement.

Fish - Improvements would be made on 1,335 acres of reservoirs for resident trout.

Water - Riparian areas would be managed at minimum levels for water quality protection. Water quality would reflect watershed conditions created by management practices, particularly by the cumulative conditions created by high levels of timber harvest and road building.

Research Natural Areas - This alternative would provide for research needs and opportunities through five Research Natural Areas (RNAs). Of the five RNAs included in this alternative, four are established areas and one is a proposed new area to meet requirements of the Pacific Northwest Research Natural Area Committee.

ALTERNATIVE A (No Action)

Goal Statement - Alternative A represents implementation of the Forest's existing Land Allocations with the addition of Management Requirements for wildlife habitat and riparian areas, and updates on inventories of land suitability and timber yield tables. This alternative emphasizes a high level of timber production, with a low emphasis on roadless recreation, and other non-commodity forest uses.

Recreation - The current mix of public and private sector management of developed sites would remain unchanged. A 108-day managed season for developed facilities would be in effect.

Semiprimitive motorized and nonmotorized dispersed recreation opportunities would be provided from several land allocations including the Waldo Lake Recreation Area and the Oregon Cascades Recreation Area (OCRA). The OCRA is managed to provide motorized use throughout the year.

Sixty-one percent of the Forest would be open to off-road vehicles (ORVs); 39% would be either closed or restricted to a specified season of use and/or type of vehicle.

Existing nonwilderness trails, totaling 714 miles, are retained in this alternative; periodic trail reconstruction and regular maintenance would be done to keep the entire trail system to standard.

Management of Wilderness would be accomplished with current budget levels. Increases in future use would be limited to user capacity of each WRS class MA. Trail maintenance, and resource protection and rehabilitation measures would be employed routinely. No additional trails would be constructed.

Nomination of sites to the National Register of Historic Places would be performed as necessary.

The characteristics of four areas (1,109) in the Forest would be preserved as Special Interest Areas (SIAs) in this alternative. These are Monument Peak Botanical Area, Wolf Rock Geological Area, Lamb Butte Scenic Area, and Tumblebug Gorge Geological Area. Also in this alternative, 22 specimen old-growth timber groves, totaling 2,730 acres, are allocated to provide for recreational use, educational study, and aesthetic appreciation.

Roadless Lands - This alternative would maintain significant portions of eight inventoried roadless areas and lesser amounts of other inventoried roadless areas in an undeveloped condition. The majority of the Mt. Hagan roadless area would be allocated to multiple-use management, including a Research Natural Area and timber harvest.

Visual Resources - This alternative emphasizes a high to moderate level of scenic quality within foreground zones of all State and Federal highways. The overall scenic quality of Forest viewshed corridors, however, have a low to moderate emphasis.

The foreground areas of all State and Federal highways, selected major Forest roads, and selected trails would be managed to ensure that landscape alterations are not evident from within the area (Visual Quality Objective (VQO) of Retention). In addition, the foreground areas of selected Forest roads, and trails are managed to ensure that changes, while noticeable, remain subordinate to the character of the surrounding landscape (VQO of Partial Retention).

Portions of middleground view areas from State Highway 22 and State Highway 126 and from selected Forest roads, are managed to provide a landscape scene where alterations are subordinate to the character of the surrounding area (VQO of Partial Retention).

Old Growth - A minimum of approximately 337,000 acres of old growth (R-6 definition) are maintained after fifty years in this alternative. These acres are in areas administratively and legislatively removed from development, lands unsuited for timber production, and areas set aside for riparian and wildlife Management Requirements, and as specimen old-growth groves. Old growth would also be present in areas of timber production for several decades.

Timber - Timber harvest would be scheduled on a suited landbase of 874,291 acres. Approximately 743,400 acres would be managed on rotations of less than 100 years, and 131,000 acres on rotation ages of 100 to 200 years. The Allowable Sale Quantity (ASQ) of 608 MMBF for the 1st decade would be about 98% of the the average amount sold annually between 1977 and 1989.

Wildlife - Bald eagle protection would be provided in 21 areas including five active nest sites. Active nest sites would have site specific management plans prepared, and 30 acres of old growth habitat

would be allocated for each potential nest site. All area within 1.1 miles of eleven major water bodies would be considered potential locations for roost, forage, or nest sites.

Management Requirements for peregrine falcon would be met by protecting two potential nest sites.

Suitable habitat would be provided to meet Management Requirements for the northern spotted owl, pileated woodpecker, and marten. Forest-wide habitat networks would be established for each species. This includes 59 spotted owl habitat areas occupied by 60 verified pairs of spotted owls. Approximately 81,075 acres would be specifically dedicated to spotted owl habitat. The remaining spotted owl habitat consists of lands unsuited for timber production. Habitat capability for 35 pairs of spotted owls would be provided in wilderness areas, occupied by 15 verified pairs. Designating 100 marten habitat areas (160 acres each) and 38 pileated woodpecker habitat areas (300 acres each) would meet the Management Requirements for habitat distribution for these species. Additional marten and pileated woodpecker habitat would occur in spotted owl habitat areas, wilderness areas, and in other no harvest allocations.

Effective habitat for deer and elk would be provided by designating High, Moderate, or Low Emphasis Areas. Winter range would be 18% high emphasis, 35% moderate emphasis, and 47% low emphasis. Forest-wide, optimal thermal cover would be provided wherever old growth habitat and no harvest allocations overlap. Habitat capability would be provided for a potential population 4285 elk and 21,425 deer through the fifth decade.

Created openings contiguous to meadows, talus, cliffs, and caves would not exceed one-third the size of the natural opening perimeter.

Dead and defective tree habitat needed to meet the Management Requirement for primary cavity excavating birds would be provided. Habitat would be distributed to provide for 40% of the potential population forest-wide. Individual harvest units would be managed for 20% potential populations. A minimum of two logs per acre of would be left as large down woody material on at least 10% of the harvested acres.

Habitat improvement projects would be planned in conjunction with timber sales. Projects would emphasize snag creation, access management, and forage enhancement.

Fish - Improvements would be made on 1,335 acres of reservoirs for resident trout.

Water - Riparian areas would be managed at minimum levels for water quality protection. Water quality would reflect watershed conditions created by management practices, particularly the cumulative changes in watershed condition resulting from timber harvest and road construction.

Research Natural Areas - This alternative would provide for research needs and opportunities through six Research Natural Areas (RNAs). Of the six RNAs included in this alternative, four are established areas, and two are proposed new areas to meet requirements of the Pacific Northwest Research Natural Area Committee.

ALTERNATIVE J

Goal Statement - Alternative J represents a moderate emphasis on nonmarket resources, and a moderate emphasis on commodity production. The focus is to balance the need for timber supply at levels near historical levels, while maintaining several important roadless areas, important old-growth

areas, and scenery issues in a way that provides some degree of issue resolution for each. This was the Preferred Alternative of the DEIS.

Recreation - All existing sites would remain open under the current mix of public and private management. Existing capacity of publicly managed sites would be expanded. A 108-day managed season for developed facilities would be in effect except where it is cost effective to extend the use season.

Emphasis is placed on maintaining significant portions of the Forest's semiprimitive dispersed recreation opportunities in an undeveloped condition. Areas available for semiprimitive nonmotorized recreation use total 89,458 acres, while motorized opportunities in a semiprimitive recreational setting are provided from 31,291 acres of Forest. The OCRA is managed to provide for motorized use over the entire area during winter, and on designated trails during snow free periods.

Fifty-nine percent of the Forest would be open to off-road vehicles (ORVs), 6% restricted to a specified season of use and/or type of vehicle, and 35% closed to ORVs.

All existing nonwilderness trails (714 miles) are retained in this alternative and 40 miles of new trails would be constructed, with priority given to those trails located in semiprimitive nonmotorized recreation areas. Periodic trail reconstruction and regular maintenance would be done to keep the entire trail system to standard.

Management of Wilderness would be accomplished with current budget levels. Increases in future use be limited to user capacity of each WRS class MA. Trail maintenance, and resource protection and rehabilitation measures would be employed routinely. No additional trails would be constructed.

Interpretation of cultural sites and public awareness efforts would be maintained at current levels. Nomination of all Forest historic sites to the National Register of Historic Places would be emphasized.

Twenty-seven areas (22,598) having significant characteristics as either scenic, geologic, botanic, historic, or archeologic Special Interest Areas are included in this alternative. The McKenzie River from Scott Creek to the Forest boundary, Fall Creek, and the South Fork of the McKenzie River would be designated as Special Interest Areas. Also included as Special Interest Areas would be the historic Santiam Wagon Road and portions of the historic Central Oregon Military Wagon Road. 18 specimen old-growth timber groves, totaling 4,096 acres, are allocated to provide for recreational use, educational study, and aesthetic appreciation.

Roadless Lands - This alternative would maintain significant portions of 13 inventoried roadless areas, and lesser amounts of other inventoried roadless areas, in an undeveloped condition. The majority of the Mt. Hagan roadless area would be allocated to multiple-use management, including a Research Natural Area and timber harvest.

Visual Resources - This alternative emphasizes a moderate level of scenic quality within major viewshed corridors.

The foreground areas of all State and Federal highways, major Forest roads, and selected trails would be managed to ensure that landscape alterations are not evident (VQO of Retention). In addition, the foreground areas of selected Forest roads and trails are managed to ensure that changes, while noticeable, remain subordinate to the character of the surrounding landscape (VQO of Partial Retention).

Portions of the middleground areas of State Highways 22, 126, and 58 and U.S. Highway 20 viewshed corridors, and the viewsheds of selected Forest roads, are managed to provide a landscape scene where alterations are subordinate to the character of the surrounding area (VQO of Partial Retention). In addition, the remaining middleground areas of viewshed corridors and the viewsheds of several Forest roads are managed to ensure that alterations, although visually dominant, possess characteristics of form, line, color, texture, and scale that occur in the surrounding landscape (VQO of Modification).

Old Growth - A minimum of approximately 341,400 acres of old growth (R-6 definition) are maintained after fifty years in this alternative. These acres are in MAs administratively and legislatively removed from development, lands unsuited for timber production, and areas set aside for riparian and wildlife Management Requirements. Old growth would also be present in areas in timber production areas for several decades.

Timber - Timber harvest would be scheduled on a suited landbase of 853,389 acres. Approximately 720,000 acres would be managed on rotations of less than 100 years, and 133,000 acres on rotation ages of 100 to 200 years. The Allowable Sale Quantity (ASQ) of 530 MMBF for the 1st decade would be about 85% of the average amount sold annually between 1977 and 1989.

Wildlife - Bald eagle protection would be provided in 24 areas including five active nest sites. Active nest sites would have site specific management plans prepared, and 30 acres of old growth habitat would be allocated for each potential nest site. All area within 1.1 miles of eleven major water bodies would be considered potential locations for roost, forage, or nest sites.

Management Requirements for peregrine falcon would be met by protecting 12 potential nest sites.

Suitable habitat would be provided to meet Management Requirements for the northern spotted owl, pileated woodpecker, and marten. Forest-wide networks would be established for each species. This includes 59 spotted owl habitat areas occupied by 60 verified pairs of spotted owls. Approximately 70,560 acres would be specifically dedicated to spotted owl habitat. The remaining spotted owl habitat consists of lands unsuited for timber production. Habitat capability for 35 pairs of spotted owls would be provided in wilderness areas, occupied by 15 spotted owl pairs. Designating 100 marten habitat areas (160 acres each) and 38 pileated woodpecker habitat areas (300 acres each) would meet the Management Requirements for habitat distribution for these species. Additional marten and pileated woodpecker habitat would occur in spotted owl habitat areas, wilderness areas, and in other no harvest allocations.

Effective habitat for deer and elk would be provided by designating High, Moderate, or Low Emphasis Areas. Winter range would be 35% high emphasis, 26% moderate emphasis, and 39% low emphasis. Forest-wide, optimal thermal cover would be provided wherever old growth habitat and no harvest MAs overlap. An additional 4970 acres of optimal thermal cover would be allocated to site specific high emphasis winter ranges. Habitat capability would provide for a potential population 5709 elk and 28,545 deer through the first decade. The habitat capability would decline through the fifth decade resulting in habitat capable of providing potential populations of 4441 elk and 22,210 deer.

Created openings contiguous to meadows, talus, cliffs, and caves would not exceed one-third the size of the natural opening perimeter. Protection of these special and unique habitats would result in 11,348 acres removed from lands suited for timber production.

Dead and defective tree habitat needed to meet the Management Requirement for primary cavity excavating birds would be provided. Habitat would be distributed to provide for 40% of the potential population within each sub-watershed. Individual harvest units could be managed for 20% potential

populations provided the sub-watershed habitat objective is met. A minimum of two logs per acre of would be left as large down woody material on at least 10% of the harvested acres.

Habitat enhancement projects would be planned in conjunction with timber sales. Projects would emphasize snag creation, access management, and forage enhancement.

Fish - Improvements would be made on 1,335 acres of reservoirs for resident trout.

Water - Riparian areas would be managed at minimum levels for water quality protection. Water quality would reflect watershed conditions created by management practices, particularly the cumulative conditions resulting from the levels of roadbuilding and timber harvest emphasized in the alternative.

Research Natural Areas - This alternative provides for research needs and opportunities through nine Research Natural Areas (RNAs). Of the nine RNAs included in this alternative four are established areas and five are proposed new areas to meet requirements of the Pacific Northwest Research Natural Area Committee.

ALTERNATIVE W

Goal Statement - This alternative is designed to provide a healthy, diverse, and productive ecosystem that would ensure the capability of the Forest to produce a continuous flow of a variety of goods and services to the public over the long-term. Alternative W was formulated to respond to public comments to the Draft Land and Resource Management Plan.

The ability to provide a dependable supply of timber to the market would continue. This alternative recognizes the importance of maintaining old-growth characteristics in some managed stands. Where timber production is either reduced below biological potential or removed from scheduled timber production to provide other resource benefits, this alternative would emphasize the use of these areas to support other compatible goals such as wildlife, dispersed recreation, watershed protection, biological diversity and ecological studies.

Additional recreation opportunities would include expanding activities compatible with areas withdrawn from timber harvesting as well as providing opportunities such as low elevation hiking trails within areas intensively managed for timber production.

A special emphasis of this alternative would be to recognize the role of river corridors and streamside zones on the Forest as critical components in the overall ecosystem. Management activities in these areas would focus on maintaining and enhancing the long term productivity, first, for those uses dependent on rivers and streams and secondly, for other resources. Timber scheduling would be responsive to the cumulative effects of watershed conditions. Very effective Best Management Practices would be used in the area of potentially unstable lands and Class IV streams.

Recreation - All existing sites would remain open under the current mix of public and private management. Existing capacity of publicly managed sites would be expanded. In addition new sites would be identified for development to meet expected demand for developed site use. A 108-day managed season for standard service facilities would be in effect except where it is cost effective to extend the season.

Emphasis is placed on maintaining significant portions of the Forest's semiprimitive dispersed recreation opportunities in an undeveloped condition. Areas available for semiprimitive nonmotorized recreation use total 85,768 acres, while motorized opportunities in a semiprimitive recreational setting are provided

from 36,048 acres of Forest. The OCRA is managed to provide for motorized use over the entire area during winter, and on designated trails during snow free periods.

57% of the Forest is open to off-road vehicles (ORVs), 6% is restricted to a specified season of use and/or type of vehicle, and 37% is closed to ORVs.

All existing non-Wilderness trails (714 miles) are retained in this alternative and 60 miles of new trails would be constructed. In addition all existing and proposed non-Wilderness trails (1,266 miles) are assigned to one of four trail management classes. Each Trail Management Class provides protection to individual trails and trail segments in relation to the amount and type of use, user experiences, public interest, and adjacent management influences associated with each trail segment. Periodic trail reconstruction and regular maintenance would be done to keep the entire trail system to standard.

Management of Wilderness would be accomplished with increased budget levels. Increases in future use would be limited to user capacity of each WRS class MA. Trail maintenance, and resource protection and rehabilitation measures would be employed routinely. No additional trails would be constructed.

Interpretation of cultural sites and public awareness efforts would be maintained at current levels. Nomination of all Forest historic sites to the National Register of Historic Places would be emphasized.

Forty-seven areas (31,120) having significant characteristics as either scenic, geologic, botanic, historic, or archeologic Special Interest Areas are included in this alternative. The McKenzie River from Scott Creek to the Forest boundary, Fall Creek, and the South Fork of the McKenzie River are designated as Special Interest Areas. Also included as Special Interest Areas are the historic Santiam Wagon Road and portions of the historic Central Oregon Military Wagon Road. In addition this alternative includes 32 specimen old-growth timber groves, totaling 6,655 acres, to provide for recreational use, educational study, and aesthetic appreciation.

Roadless Lands - This alternative maintains significant portions of 13? inventoried roadless areas, and lesser amounts of other inventoried roadless areas, in an undeveloped condition. The majority of the Mt. Hagan roadless area would be allocated to multiple-use management, including a Research Natural Area and timber harvest.

Visual Resources - This alternative emphasizes a moderate level of scenic quality within major viewshed corridors.

The foreground areas of all State and Federal highways, major Forest roads, and selected trails are managed to ensure that landscape alterations are not evident (VQO of Retention). In addition, the foreground areas of selected Forest roads and trails are managed to ensure that changes, while noticeable, remain, at least, subordinate to the character of the surrounding landscape (VQO of Partial Retention).

Portions of the middleground areas of State Highways 22, 126, and 58 and U.S. Highway 20 viewshed corridors, and the viewsheds of selected Forest roads, are managed to provide a landscape scene where alterations are subordinate to the character of the surrounding area (VQO of Partial Retention). In addition, the remaining middleground areas of viewshed corridors and the viewsheds of several Forest roads are managed to ensure that alterations, although visually dominant, possess characteristics of form, line, color, texture, and scale that occur in the surrounding landscape (VQO of Modification).

Old Growth - Critical components of old growth, such as down woody debris and scattered residual trees are maintained in intensively managed stands.

Approximately 365,200 acres of old growth (R-6 definition) are maintained after fifty years in this alternative. These acres are in areas administratively and legislatively removed from development, lands unsuited for timber production, areas set aside for riparian, special wildlife habitats, management indicator species, and as specimen Old-Growth groves. Old growth would also be present in areas of timber production for several decades.

Timber - Timber harvest would be scheduled on a suited landbase of 774,608 acres. Approximately 689,000 acres would be managed on rotations of less than 100 years, and 85,000 acres on rotation ages of 100 to 200 years. The Allowable Sale Quantity (ASQ) of 491 MMBF for the 1st decade would be about 79% of the average amount sold annually between 1977 and 1989.

Timber harvest design would include:

Maintaining critical components of old growth, such as down woody debris and scattered residual trees, in intensively managed stands;

Minimizing the fragmentation of forest stands, particularly mature and older stands, by utilizing management options of scheduling the location and timing of harvest.

Wildlife - Bald eagle protection would be provided in 24 areas including five active nest sites. Active nest sites would have site specific management plans prepared, and at least 125 acres of old growth habitat would be allocated for each potential nest site. All area within 1.1 miles of eleven major water bodies would be considered potential locations for roost, forage, or nest sites.

Management Requirements for peregrine falcon would be met by protecting 12 potential nest sites.

Suitable habitat would be provided to meet Management Requirements for the northern spotted owl, pileated woodpecker, and marten. Forest-wide networks would be established for each species. This includes 59 spotted owl habitat areas occupied by 60 verified pairs of spotted owls. Approximately 69,045 acres would be specifically dedicated to spotted owl habitat. The remaining spotted owl habitat consists of lands unsuited for timber production. Habitat capability for 35 pairs of spotted owls would be provided in wilderness areas, occupied by 15 verified pairs. Designating 100 marten habitat areas (160 acres each) and 38 pileated woodpecker habitat areas (300 acres each) would meet the Management Requirements for habitat distribution for these species. Some marten and pileated woodpecker habitat areas overlap with visual corridors managed on rotations of 150 to 200 years. Where this occurs, these habitat areas would be managed to meet habitat requirements. Managed marten areas would be 500 acres, and managed pileated woodpecker areas would be 1000 acres. Additional marten and pileated woodpecker habitat would occur in spotted owl habitat areas, wilderness areas, and in other no harvest allocations.

Effective habitat for deer and elk would be provided by designating High, Moderate, or Low Emphasis Areas. Winter range would be 31% high emphasis, 46% moderate emphasis, and 23% low emphasis. Forest-wide, optimal thermal cover would be provided wherever old growth habitat is protected in no harvest MAs, or where MAs have rotations longer than 170 years. Site specific allocation of 4100 acres of optimal thermal cover would be made for high emphasis winter ranges. Habitat capability would be provided for a potential population of 6089 elk and 30,628 deer through the first decade. An additional allocation of approximately 1200 acres of optimal thermal cover would be required to maintain habitat capability through the fifth decade.

Buffers would be provided around natural meadows, marshes, bogs, cliffs, talus, and caves to protect microclimate conditions and overall habitat values of these areas. Protection of microclimate and unique habitats would result in 31,334 acres removed from lands suited for timber production.

Dead and defective tree habitat needed to meet the Management Requirement for primary cavity excavating birds would be provided. Habitat would be distributed to provide for 40% of the potential population within each sub-watershed. Individual harvest units could be managed for 20% potential populations provided the subwatershed habitat objective is met. An average of 8-15 logs per acre would be left as large down woody material on all harvested acres.

Habitat improvement projects would be planned in conjunction with timber sales and through the development of an active habitat enhancement program throughout the Forest. Projects would emphasize a broad spectrum of wildlife habitat projects including waterfowl habitat, osprey platforms, sensitive plant habitat, snag creation, access management, elk forage enhancement, wetland development and enhancement, bald eagle nest, roost,and forage area enhancement, and establishment of peregrine falcon nest sites.

Fish - Improvements would be made on 1,450 acres of reservoirs for resident trout. Riparian areas would be managed to increase levels of Large Woody Material recruited to the stream above current levels.

Water - Management practices would maintain or improve water quality to levels which meet or exceed the needs of the beneficial uses of the water. Riparian areas would be managed above minimum levels for water quality in order to aid in the recovery of current stream conditions, and to meet objectives for dispersion of wildlife between habitat areas, and recreation opportunities. No harvest would be programmed adjacent to Class I, II and III streams. Timber harvest would be designed to minimize risk of debris torrents by retaining trees as needed to provide stability in areas of moderately stable and potentially highly unstable landtypes on slopes adjacent to Class IV streams. Timber harvest would be scheduled at rates which would consider the cumulative effects on peak flows in subdrainages. Because of the importance and uniqueness of the streams and riparian areas, this alternative would stress the need to complete an inventory of these areas and prescribe treatments based on site-specific conditions.

Research Natural Areas - This alternative provides for research needs and opportunities through nine Research Natural Areas (RNAs). Of the nine RNAs included in this alternative four are established areas and five are proposed new areas to meet requirements of the Pacific Northwest Research Natural Area Committee.

ALTERNATIVE D

Goal Statement - Alternative D represents a high emphasis on non-market resources with a moderate emphasis on commodity production.

Habitat for Pileated Woodpecker, Martens, and Spotted Owls would exceed levels required for Management Levels. Many areas would be managed for high quality big game habitat, and many unique special wildlife habitat areas would be recognized.

Dispersed Recreation would be emphasized by maintaining several Roadless areas in their current condition. The scenic quality from many major highways would remain natural.

Riparian areas would be managed to provide input of near-natural levels of large woody material for fish habitat maintenance and improvement.

Recreation - All existing developed recreation sites would remain open. To meet future demand, the existing capacity of publicly managed sites would be expanded through development of new sites. A 120-day managed season for developed facilities would be in effect.

Emphasis would be placed on maintaining the Forest's semiprimitive dispersed recreation opportunities in an undeveloped condition. Areas available for semiprimitive nonmotorized recreation use total 176,484 acres, while motorized opportunities in a semiprimitive recreational setting are provided from 38,245 acres.

In this alternative 54% of the Forest is open to off-road vehicles (ORVs), 5% is restricted to a specified season of use and/or type of vehicle, and 41% is closed to ORVs. The OCRA is managed to provide motorized use over the entire area in winter, and on designated trails during snow free periods.

All existing nonwilderness trails (714 miles) are retained in this alternative, and 68 miles of new trail would be constructed with priority given to those trails located in semiprimitive nonmotorized recreation areas. Periodic trail reconstruction and regular maintenance would be done to keep the entire trail system to standard.

Wilderness would be managed for primitive and semiprimitive WRS class opportunities. Areas that currently exceed capacity for these opportunities would be regulated to reduce social and physical resource impacts and enhance user experiences. Future use would be limited to user capacity levels of each WRS class MA. Trail maintenance, and resource protection and rehabilitation measures would be employed routinely. No new trails would be constructed.

On-site interpretation of specific aspects of cultural resource management is featured. Nomination of sites to the National Register of Historic Places would be performed as necessary.

The McKenzie River from Scott Creek to the Forest boundary is allocated as a Special Interest Area in this alternative. The characteristics of 28 of 49 potential Special Interest Areas are preserved by their allocation to a Special Interest Area MA. In this alternative the historic Santiam Wagon Road and the Oregon Military Wagon Road are included as Special Interest Areas. Also 18 groves of specimen old-growth timber, totaling 3,029 acres, would be maintained to provide for such uses as recreation, aesthetic appreciation, and educational purposes.

Roadless Lands - This alternative maintains significant portions of most inventoried roadless areas, and lesser amounts of other inventoried roadless areas in an undeveloped condition. The Mt. Hagan roadless area would be allocated to dispersed recreation, semi-primitive nonmotorized and Research Natural Area prescriptions.

Visual Resources - This alternative emphasizes a high level of scenic quality throughout the Forest.

The foreground areas of all State and Federal highways, major Forest roads, and selected trails are managed to ensure that landscape alterations are not evident (VQO of Retention). In addition, the foreground areas of selected Forest roads, and trails are managed to ensure that changes, while noticeable, remain subordinate to the character of the surrounding landscape (VQO of Partial Retention).

Also, portions of the middleground areas of all State and Federal highways and major Forest road viewshed corridors are managed to ensure that changes remain subordinate to the character of the

surrounding area (VQO of Partial Retention). In addition, the middleground areas of several Forest viewshed corridors are managed to provide landscapes in which physical alterations vary from being noticeable but subordinate, to visually dominant (VQO of Partial Retention to Modification).

Old Growth - A minimum of approximately 368,000 acres of old growth (R-6 definition) are maintained after fifty years in this alternative. These acres are in areas administratively and legislatively removed from development, lands unsuited for timber production, areas set aside for riparian and wildlife Management Requirements, and as specimen Old-Growth groves. Old growth would remain in some portions of areas managed for intensive timber harvest through the planning period.

Timber - Timber harvest would be scheduled on a suited landbase of 719,439 acres. Approximately 639,000 acres would be managed on rotations of less than 100 years, and 80,000 acres on rotation ages of 100 to 200 years. The Allowable Sale Quantity (ASQ) of 476 MMBF for the 1st decade would be about 77% of the average amount sold annually between 1977 and 1989.

Wildlife - Bald eagle protection would be provided in 27 areas including five active nest sites. Active nest sites would have site specific management plans prepared, and at least 125 acres of old growth habitat would be allocated for each potential nest site. All area within 1.1 miles of eleven major water bodies would be considered potential locations for roost, forage, or nest sites.

Management Requirements for peregrine falcon would be met by protecting 12 potential nest sites.

Suitable habitat would be provided to exceed Management Requirements for the northern spotted owl, pileated woodpecker, and marten. Forest-wide networks would be established for each species. This includes 98 spotted owl habitat areas occupied by verified pairs of spotted owls. Approximately 121,248 acres would be specifically dedicated to spotted owl habitat. The remaining spotted owl habitat consists of lands unsuited for timber production. Habitat capability for 40 pairs of spotted owls would be provided in wilderness and roadless areas, occupied by 20 verified pairs. Designating 100 marten habitat areas (160 acres each) and 38 pileated woodpecker habitat areas (300 acres each) would ensure Management Requirements for habitat distribution are met these species. Additional marten and pileated woodpecker habitat would occur in spotted owl habitat areas, wilderness areas, and in other no harvest allocations.

Effective habitat for deer and elk would be provided by designating High, Moderate, or Low Emphasis Areas. Winter range would be 66% high emphasis, 21% moderate emphasis, and 14% low emphasis. Forest-wide, optimal thermal cover would be provided wherever old growth habitat is protected in no harvest MAs, or where MAs have rotations longer than 170 years. A site specific allocation of 7600 acres of optimal thermal cover would be made for high emphasis winter ranges. Habitat capability would be provided for a potential population of 9019 elk and 45,325 deer through the fifth decade.

Buffers approximately 400 feet wide would be provided around natural meadows, marshes, bogs, cliffs, talus, and caves to protect microclimate conditions and overall habitat values of these areas. Protection of these special and unique habitats would result in an estimated 20,000 acres removed from lands suited for timber production.

Dead and defective tree habitat needed to exceed Management Requirements for primary cavity excavating birds would be provided. Habitat would be distributed to provide for 60% potential populations within each sub-watershed. Individual harvest units would also be managed for 60% potential populations. An average of 8-15 logs per acre would be left as large down woody material on all harvested acres.

Habitat improvement projects would be planned in conjunction with timber sales and through the development of an active habitat enhancement program throughout the Forest. Projects would emphasize

sensitive species inventories as well as wildlife habitat projects including waterfowl nesting habitat, osprey platforms, sensitive plant habitat restoration, snag creation, access management, elk forage enhancement, wetland development and enhancement, bald eagle nest, roost and forage area enhancement, and establishment of peregrine falcon nest sites.

Fish - Improvements would be made on 1,450 acres of reservoirs and streams. Riparian areas along Class I and II streams would be managed to provide near or above natural levels of input of large woody material for fish habitat.

Water - Riparian areas along streams, lakes would be managed above minimum levels for water quality. No timber harvest would be scheduled along Class I and II streams, and timber harvest along Class III riparian areas would be based on 200 year rotations. Timber harvest would be designed to protect areas of potentially unstable landtypes upslope and adjacent to Class IV streams. Water quality would reflect watershed conditions created by management practices.

Research Natural Areas - This alternative provides for research needs and opportunities through eight Research Natural Areas (RNAs). Of the eight RNAs included in this alternative, four are established areas and four are proposednew areas to meet requirements of the Pacific Northwest Research Natural Area Committee.

ALTERNATIVE L

Goal Statement - Alternative L places a high emphasis on nonmarket values, and low emhasis on timber commodity values by preserving areas currently not highly impacted by past management activities in their natural condition and by proposing other areas for natural recovery from the effects of past management. This alternative was formulated with input from the Oregon Natural Resources Council (ONRC).

High levels and quality of recreation opportunities and experiences would be provided. Scenery would be enhanced by managing all areas according to Visual Quality Objectives, and by rehabilitating unacceptable modifications.

The full inventory of roadless areas would be maintained in an undeveloped condition with an emphasis on semi-primitive nonmotorized activities. Opportunities for high quality Wilderness experiences would be increased by proposing additional areas for Wilderness study and for Wilderness designation.

The quantity, quality and diversity of plant and animal communities would be maintained at high levels. All management requirements for Pileated Woodpeckers, Martens and Spotted Owl would be exceeded, and habitat would be provided for the full inventory of verified Spotted Owl pairs. All areas of diverse habitats, geological significant areas, and millenium old-growth groves would be managed to protect and enhance desirable attributes. Old-growth characteristics would be retained in all managed stands.

Riparian areas would be managed to maintain and enhance riparian dependent species and connective corridors across the landscape.

Recreation - All existing developed recreation sites would remain open. To meet future demand, the existing capacity would be expanded. High levels of recreation opportunities and high quality experiences would be provided. A 120-day managed season for developed facilities would be in effect.

This alternative provides the maximum amount of motorized and nonmotorized areas for semiprimitive recreation opportunities. Emphasis is placed on maintaining opportunity settings in their undeveloped condition. In this alternative, the Oregon Cascades Recreation Area is managed for nonmotorized use year-round.

Thirty-eight percent of the Forest is open to off-road vehicles (ORVs), 3% is restricted to a specified season of use and/or type of vehicle, and 59% is closed to ORVs.

All existing nonwilderness trails (714 miles) are retained in this alternative, and 40 miles of new trail would be constructed with priority given to those trails located in semiprimitive nonmotorized recreation areas. Periodic trail reconstruction and regular maintenance would be done to keep the entire trail system to standard.

All Wilderness would be managed for primitive and semiprimitive use opportunities. High quality Wilderness experiences would be provided by proposed additional Wilderness. Areas that currently exceed capacity for these opportunities would be regulated to reduce social and physical resource impacts and enhance user experiences. Future use would be limited to user capacity of each WRS class MA. Trail maintenance and resource protection and rehabilitation measures would be employed routinely. No new trails would be constructed.

On-site interpretation of specific aspects of the cultural resource, as well as off-site public awareness of management programs is featured. All eligible cultural resource sites would be nominated to the National Register of Historic Places.

The characteristics of all potential Special Interest Areas are preserved in this alternative. However, only 7 areas are allocated to a Special Interest MA prescription. The remaining areas are included in other nondevelopment MAs. Also 24 groves of specimen old-growth timber, totaling 3,056 acres, would be maintained to provide for such uses as recreation, aesthetic appreciation, and educational purposes in this alternative.

Visual Resources - This alternative emphasizes a high level of scenic quality throughout the Forest.

The foreground areas of State and Federal highways, major Forest roads, and selected trails are managed to ensure that landscape alterations are not evident (VQO of Retention). Although these areas are not in each case allocated to Scenic Resource MAs they, however, provide comparable scenic quality levels. In addition, the foreground areas of selected Forest roads and trails are managed to ensure that changes, while noticeable, remain subordinate to the character of the surrounding landscape (VQO of Partial Retention).

Also, portions of the middleground areas of all State and Federal highways and major Forest road viewshed corridors are managed to provide a landscape where physical alterations, while noticeable, are subordinate to the surrounding area (VQO of Partial Retention). In addition, the middleground areas of several Forest viewshed corridors are managed to provide landscapes in which physical alterations vary from subordinate to not evident (VQO of Retention to Partial Retention).

Roadless Lands - This alternative recommends designation of several roadless areas to Wilderness status, and maintains nearly all inventoried roadless areas in an undeveloped condition. About 85% of current roadless lands would be maintained in a roadless condition, with an emphasis on preserving wilderness values and maintaining semiprimitive non motorized opportunities.

Old Growth - This alternative emphasizes the continuation of old-growth characteristics throughout the Forest. Lands of 300 acres and more, where 70% of the trees are mature, would be managed as old-growth reserves, with no-harvest. Areas of at least 300 acres which have not previously been managed for timber production, and where at least 70% of the forest is young, natural stands, would be managed on rotations of up to 240 years, with harvest activity permitted only from the existing road system. Areas on smaller blocks of old growth would be managed with rotations lengths of between 80 and 160 years. In these and other areas 8 to 10 mature trees per acre would be maintained to provide future old-growth characteristics.

Approximately 523,000 acres of old growth (R-6 definition) are maintained after fifty years in this alternative. These acres are in areas administratively and legislatively removed from development, lands unsuited for timber production, and areas set aside for a variety of uses.

Timber - Timber would be managed for commercial use on 553,090 acres of the Forest, with approximately 314,000 acres in rotation ages of less that 100 years, and 239,000 acres in rotation ages of 100 to 200 years. The Allowable Sale Quantity (ASQ) of 150 MMBF for the 1st decade would be 24% of the average amount sold annually between 1977 and 1989.

Wildlife - Bald eagle protection would be provided in 27 areas including five active nest sites. Active nest sites would have site specific management plans prepared, and at least 125 acres of old growth habitat would be allocated for each potential nest site. All area within 1.1 miles of eleven major water bodies would be considered potential locations for roost, forage, or nest sites.

Management Requirements for peregrine falcon would be met by protecting 12 potential nest sites.

Suitable habitat would be provided to exceed Management Requirements for the northern spotted owl, pileated woodpecker, and marten. Forest-wide networks would not be established for each species. The emphasis placed on protection and replacement of mature and old growth forests would maintain habitat capability for the full inventory of verified spotted owl pairs. The full inventory is 219 verified pairs of spotted owls. Habitat capabiltiy for pileated woodpeckers and marten would be above the Management Requirement. Distribution and quality of mature and old growth habitat would not be limited.

Effective habitat for deer and elk would be provided by designating High, Moderate, or Low Emphasis Areas. Winter range would be 41% high emphasis, 42% moderate emphasis, and 17% low emphasis. Forest-wide, optimal thermal cover would not be limiting because of the amount of the Forest in no harvest and extended rotation MAs. Created opening would become limiting and would result in the need to intensively manage natural and created openings for deer and elk forage production. Habitat capability would be provided for a potential population of 7068 elk and 35,340 deer through the fifth decade.

Buffers would be provided around natural meadows, marshes, bogs, cliffs, talus, and caves to protect microclimate conditions and overall habitat values of these areas. Protection of these special and unique habitats would result without a specific allocation reducing lands suited for timber production.

Dead and defective tree habitat needed to exceed Management Requirements for primary cavity excavating birds would be provided. Habitat would be distributed to provide for 60% potential populations within each sub-watershed. Individual harvest units would also be managed for 60% potential populations. An average of 8-15 logs per acre would be left as large down woody material on all harvested acres.

Habitat improvement opportunities planned in conjunction with timber sales would be limited. Projects would emphasize forage enhancement using native plant species and snag creation. Wildlife habitat programs would be oriented more toward inventory and monitoring with reduced need for mitigation habitat loss.

Fish - Improvement projects, for resident fish, would be implemented on 1,450 acres of reservoirs and streams. Riparian management of Class I and II streams would continue near or above natural levels of input of woody material.

Water - Riparian areas would be managed above minimum levels for water quality in order to aid in the recovery of current stream conditions, and to meet objectives for other riparian resources. Full protection of riparian areas along Class III streams would minimize reduction in water quality. Timber harvest would be designed to protect areas of potentially unstable landtypes upslope and adjacent to Class IV streams.

Research Natural Areas - This alternative provides for research needs and opportunities through four established Research Natural Areas (RNAs).

COMPARISON OF ALTERNATIVES

Overview

This section presents the alternatives in a manner designed to facilitate comparison. The aspects of alternatives presented for comparison include:

- Allocations of land to specific management areas;
- Resource management programs;
- Activities, resource outputs, and environmental effects;
- Responsiveness to issues and concerns;
- Economic criteria including costs, benefits, present net value and cash flows.

These items are presented in map, tabular, and written form, with the intent of condensing a great deal of complex information into a format which allows efficient and effective comparison of Alternatives. This section concludes with a discussion of the principal tradeoffs associated with each alternative.

The purpose of forest planning is to identify and select for implementation the Alternative which most nearly maximizes net public benefits while responding effectively to the public issues. Net public benefits are defined as the "...overall long-term value to the nation of all outputs and positive effects (benefits), less all associated inputs and negative effects (costs) whether they can be quantitatively valued or not...consistent with the principles of multiple use and sustained yield" (36 CFR 219.3).

The assessment of net public benefits must include both those outputs which have prices (such as timber and developed recreation) and those to which no price can be attached (such as scenic quality and the maintenance of viable wildlife populations). Thus, net public benefits cannot be expressed as a single, quantitative measure, but rather must be gauged using both quantitative and qualitative criteria. There is no precise formula for determining which Alternative maximizes net public benefits. Indeed, there are often differences of opinion as to whether particular outputs or effects are benefits or costs. Therefore, it is necessary to identify major effects of each alternative separately to serve as the basis for analysis, judgement, and selection of the preferred Alternative. The remainder of this section highlights these effects in a comparative manner to facilitate identification of net public benefits.

Management Areas

Management areas are portions of the National Forest to which a specific set of management practices are applied and for which standards and guidelines have been developed. All of the management areas considered in the alternatives, which provide for all multiple-uses and resources, are briefly described. Although a specific use or resource may be featured or emphasized in each management area, all other uses and resources are provided for in the standards and guidelines established for each management area.

Forest land is managed in accord with the standards and guidelines of the management area to which it is allocated. This assures that potentially adverse environmental effects are avoided, minimized, rectified, reduced, or otherwise mitigated while achieving basic management area objectives. Standards and guidelines were developed by an interdisciplinary team to ensure integration and coordination of the various multiple uses and resource values, and to respond to the specific environmental conditions of the Forest. Standards and guidelines that apply to the entire Forest were also developed, and are displayed in Chapter IV of the Proposed Forest Plan.

The land area of the Forest is allocated to management areas differently in each alternative. Table II-3 illustrates how the allocation of Forest land to management areas differs among the Alternatives. Alternatives are arrayed in this table in order of decreasing vegetation management using suitable acres as an indicator. A detailed prescription for each management area can be found in Chapter IV of the proposed Forest Plan. Following is a brief summary of each management area.

Table II-3. Management Area Acreage of Alternatives

	Alternatives						
Management Areas	**NC**	**K**	**A**	**J**	**W**	**D**	**L**
1 Wilderness	380,805 [1]						
Management Area 1a	NA	14,482	14,482	3,305	2,111	--	2,316
Management Area 1b	NA	25,958	25,958	36,730	34,958	14,482	81,770
Management Area 1c	NA	41,018	41,018	41,423	43,963	66,976	54,845
Management Area 1d	NA	299,347	299,347	299,347	299,773	299,347	411,234[6]
2 Oregon Cascades Recreation Area							
Management Area 2a	6,058	--	6,058	1,152	1,152	1,152	--
Management Area 2b	--	6,058	--	4,906	4,906	4,906	6,058
3 Experimental Forest							
Management Area 3	15,379	15,379	15,379	15,379	15,379	15,379	15,379
4 Research Natural Area							
Management Area 4	4,245	3,434	4,245	6,655	7,124	6,015	2,197
5 Special Interest Area							
Management Area 5a	1,109	2,751	1,109	19,410	27,942	15,230	3,391
Management Area 5b	--	--	--	3,178	3,178	--	--
6 Wild and Scenic River							
Management Area 6a [2]	--	--	--	--	--	--	--
Management Area 6b	1,237	1,237	1,237	1,237	1,237	1,237	1,237
Management Area 6c	13,225	13,225	13,225	13,225	13,225	13,225	25,788
7 Old-Growth Grove							
Management Area 7	2,730	853	2,730	4,906	6,655	3,029	199,883
8 T & E Species [3]							
Management Area 8	1,472	1,472	1,472	1,472	1,472	1,472	1,472
9 Special Habitat [4]							
Management Area 9a	--	82,782	81,075	70,560	69,045	121,248	37,541
Management Area 9b	--	10,857	11,262	10,025	9,513	8,788	7,146
Management Area 9c	--	15,870	15,742	14,867	14,568	13,182	10,601
Management Area 9d	--	9,364	--	14,888	31,355	17,555	35,386

Table II-3 Cont. Management Area Acreage of Alternatives

	Alternatives						
Management Areas	**NC**	**K**	**A**	**J**	**W**	**D**	**L**
10 Dispersed Recreation							
Management Area **10a**	--	--	--	2,090	299	2,794	--
Management Area **10b**	17,747	41,849	17,213	15,699	19,645	3,455	28,049
Management Area **10c**	--	--	--	7,977	8,873	29,947	38,245
Management Area **10d**	15,956	--	12,883	2,112	960	6,911	--
Management Area **10e**	55,181	4,949	55,181	72,672	69,898	163,655	93,746
Management Area **10f**	--	2,773	--	3,008	3,605	2,901	341
11 Scenic							
Management Area **11a**	--	96,369	--	201,227	138,176	86,080	--
Management Area **11b**	--	19,218	--	363	256	1,386	--
Management Area **11c**	23,529	26,748	19,133	52,322	70,090	114,239	184,057
Management Area **11d**	49,294	3,925	41,999	39,844	24,316	41,188	--
Management Area **11e**	12,883	7,892	11,134	5,972	8,212	4,074	51,021
Management Area **11f**	52,259	41,892	46,457	43,599	36,347	66,998	122,968
12 Developed Recreation							
Management Area **12a**	2,218	2,517	2,218	2,304	2,709	2,581	4,266
Management Area **12b**	2,112	2,112	2,112	2,368	2,389	2,133	--
13 Special and Administrative Use							
Management Area **13a**	3,839	3,839	3,839	3,839	3,839	3,839	4,543
Management Area **13b**	704	704	704	704	704	704	--
14 General Forest							
Management Area **14a**	1,011,404	825,899	880,225	610,677	646,320	496,928	195,190
Management Area **14a**	--	--	--	597	661	597	--
15 Riparian [5]							
Management Area **15**	NA	50,637	47,993	45,389	50,552	47,991	43,600

[1] Wilderness Resource Spectrum management is not applicable to the No change Alternative.
[2] All alternatives include 1,207 acres of Wild and Scenic River designation (wild classification) in the Waldo Wilderness. These acres are included in Management Area 1.
[3] Includes Existing nest area habitat only.
[4] Acres of network sites that overlap with other no harvest management areas are not included in MA9a, 9b, 9c acres. Refer to Figure II-4 for total habitat acres by alternative.
[5] Riparian acres which are not included in other management areas with no programmed harvest are allocated to MA15. Harvest rates in these Riparian Management Acres differ between alternatives, as described in Chapter II, Riparian. Riparian acres in NC are distributed throughout other management areas.
[6] Alternative L recommends designation of 169,360 acres of roadless area as Wilderness or wilderness study areas.

Wilderness

The goal of managing dedicated Wilderness is to feature naturalness, provide opportunities for solitude, challenge, and inspiration, and within these constraints to allow for recreation, scenic, scientific, educational, conservation, and historical uses. Permitted but nonconforming uses specified in the Wilderness Act would be carried out under restrictions designed to minimize their impact on the Wilderness. The criteria used for conflict resolution would be to preserve and protect the Wilderness

resource. Consistent with providing a range of wilderness opportunities and experiences each Wilderness is divided into the following management areas based on the Wilderness Resource Spectrum.

MANAGEMENT AREA - 1a (Transition)

The Transition Wilderness Resource Spectrum Class that comprises this management area is characterized predominantly by conditions of relatively concentrated use where encounters with other groups are frequent, opportunities for solitude are limited, and user controls may be highly evident. This management area is usually adjacent to major wilderness entry points or day use destination areas.

MANAGEMENT AREA - 1b (Semiprimitive)

The Semiprimitive Wilderness Resource Spectrum Class that comprises this management area includes areas which are characterized by predominantly unmodified natural environments of moderate to large size; concentration of users may be low, but there would often be evidence of other users in the area; minimum on-site controls and restrictions may be present, but are subtle.

MANAGEMENT AREA - 1c (Primitive Trailed B)

The Primitive Trailed-B Wilderness Resource Spectrum Class that comprises this management area includes areas surrounding existing and proposed trails which provide a primitive trail associated Wilderness experience. These corridors are characterized by an essentially unmodified natural environment.

MANAGEMENT AREA - 1d (Primitive Trailed A)

The Primitive Trailed-A Wilderness Resource Opportunity Spectrum Class that comprises this management area includes areas which lie between developed and maintained trail systems that provide primitive Wilderness experiences. The user would have opportunities to travel cross- country, utilizing a maximum degree of outdoor skills, often in an environment of varied terrain and vegetation that offers a high degree of challenge and risk.

Oregon Cascades Recreation Area (OCRA)

The OCRA was established by Congress for the conservation of unique geographic, topographic, biological, and ecological features, to protect wildlife, recreation, and watershed values, and provide a variety of recreation experiences. Two management areas are identified within the OCRA.

MANAGEMENT AREA - 2a (OCRA Motorized)

This area provides the opportunity, within the OCRA, for users to experience a moderate degree of isolation from the sights and sounds of human activity, establish some sense of independence and closeness to nature, and develop a moderate feeling of self-reliance through the application of outdoor skills. These experiences are provided in an environment that offers some challenge and risk to both motorized and nonmotorized use.

MANAGEMENT AREA - 2b (OCRA Nonmotorized)

This area provides the opportunity, within the OCRA, for users to experience a high degree of isolation from the sights and sounds of human activity, establish a sense of independence and closeness to nature,

and develop some feelings of tranquility and self-reliance. Recreation activities associated with this intensity are nonmotorized and nonmechanical in nature except for over-the-snow use.

Experimental Forest

MANAGEMENT AREA - 3 (H.J. Andrews Experimental Forest)

The primary objective of this management area is research and study of the effects of management activities on a wide range of multiple use resources, including watershed, wildlife, and soil as well as the effects of silvicultural practices on growth rates and harvest yields of Douglas-fir.

Research Natural Areas

MANAGEMENT AREA - 4 (Research Natural Area)

The lands within this management area would be managed for preservation of examples of natural ecosystems for comparison with those influenced by human activity; education and research for ecologic and environmental studies; and preservation of gene pools for typical, rare, or endangered species.

This management area includes established and proposed Research Natural Areas (RNA). Establishment of RNAs is an administrative designation requiring approval by the Chief of the Forest Service. Additions to the RNA system proposed by any alternative would not be implemented until approved by the Chief.

Special Interest Areas

MANAGEMENT AREA - 5a (Special Interest Area)

These areas would be managed primarily for recreation use while maintaining unusual recreational, scenic, historical, geological, botanical, zoological, paleontological, or other special characteristics or features in their natural condition. Depending on the nature of the special features, management may be directed either toward protection activities or facility development for interpretation and viewing activities. Road and trail access may be provided in development areas and discouraged where necessary for site protection.

MANAGEMENT AREA - 5b (Special Interest Area-Ecological Area)

The primary emphasis of this management area is to protect and enhance the exceptional ecological values in the Hardesty Mountain - Mount June area on the southwestern border of the Forest. Nonconsumptive resource activities would be emphasized. Access would generally be restricted to roads outside the area and existing trails within the area.

Wild and Scenic Rivers

MANAGEMENT AREA - 6a (Wild and Scenic Rivers-Wild River)

This management area preserves the Wild River characteristics of the portion of the North Fork of the Middle Fork of the Willamette River that lies within the Waldo Wilderness. Emphasis would be on the preservation of the primitive characteristics and scenic qualities of the river segment and the corridor of lands on either side.

MANAGEMENT AREA - 6b (Wild and Scenic Rivers-Scenic River)

This management area would maintain or enhance the condition of the high quality scenery and condition of the generally undeveloped shore line along designated segments of the North Fork of the Middle Fork of the Willamette River and the McKenzie River. Management activities permitted within this area would include river-oriented recreation as well as programmed timber harvests that are compatible with Scenic river management objectives. Programmed harvests would generally not exceed 5% of the total acres per decade.

MANAGEMENT AREA - 6c (Wild and Scenic Rivers-Recreation River)

This management area would maintain or enhance the recreational and scenic values associate with the free-flowing condition of designated segments of the North Fork of the Middle Fork of the Willamette River and the McKenzie River. Management activities permitted within this area would include river-oriented recreation as well as programmed timber harvests that are compatible with recreation river management objectives. Programmed harvests would generally not exceed 7% of the total acres per decade. In Alternatives J and W, an alternate prescription which excludes programmed timber harvest is applied to the Recreation segments of the McKenzie River.

Old-Growth Grove

MANAGEMENT AREA - 7 (Old Growth Grove)

In this management area outstanding, highly accessible specimen groves of old-growth timber types of the Western Cascades are preserved. These areas are established primarily for the education, use, and enjoyment of the public, and they also provide habitat for a wide range of old-growth dependent plant and animal species. No programmed timber harvest is scheduled in this management area. Management activities are limited to those which protect the flora, fauna, and ecological character of the grove, and which provide aesthetic opportunities through the use of interpretive trails and adjacent developments.

T & E Species

MANAGEMENT AREA - 8 (Threatened and Endangered Species-Bald Eagle)

The management area provides for care and maintenance of active bald eagle nest sites in the Forest. Programmed timber harvest is not permitted, however, unregulated harvest is allowed to enhance bald eagle habitat within the management area.

Special Wildlife Habitat

MANAGEMENT AREA - 9a (Spotted Owl Habitat Area)

This management area protects mature and old-growth habitat for the northern spotted owl and other flora and fauna with similar habitat requirements by providing a habitat network for the northern spotted owl, an ecological indicator species. Primary emphasis is on meeting habitat requirements for the spotted owl. Programmed timber harvest is not permitted.

MANAGEMENT AREA - 9b (Pileated Woodpecker Habitat Area)

This management area protects mature and old-growth habitat for pileated woodpeckers and other flora and fauna with similar habitat needs by providing a habitat network for the pileated woodpecker,

an ecological indicator species. Programmed timber harvests are not permitted in designated habitats. In Alternative W, core habitat areas within management areas with 150 to 200 year rotations would have programmed harvests located and scheduled in a manner that meets habitat requirements.

MANAGEMENT AREA - 9c (Pine Marten Habitat Area)

This management area protects mature habitat and old-growth for pine martens and other flora and fauna with similar habitat requirements by providing a habitat network for the pine marten, an ecological indicator species. Programmed timber harvest is not permitted. In Alternative W, core habitat areas within management areas with 150 to 200 year rotations would have programmed harvests located and scheduled in a manner that meets habitat requirements.

MANAGEMENT AREA - 9d (Special Wildlife Habitats)

This management area maintains and enhances special wildlife habitats and small botanical sites which are important to a biologically diverse ecosystem. Examples of the types of areas included are meadow complexes, cliffs, elk wallows, and talus. Only activities that benefit the featured species or habitat would be permitted. Programmed timber harvest is not permitted. Facilities or improvements for recreation or viewing may be provided if compatible with the wildlife objectives.

Dispersed Recreation

MANAGEMENT AREA - 10a (Dispersed Roaded Natural Recreation)

This management area is for dispersed roaded natural recreation opportunities, wildlife habitat, and timber resource values as well as for other multiple-uses and resources. Timber harvest in this management area would occur at a maximum rate of 10% of the suitable/available land each decade. Activities associated with this management area are motorized and nonmotorized in nature.

MANAGEMENT AREA - 10b (Dispersed Semiprimitive Motorized Recreation)

This management area manages areas within the Forest for their dispersed semiprimitive motorized recreation opportunities, wildlife habitat, and timber resource values as well as for other multiple uses and resources. Timber harvest in this management area would occur at a maximum rate of 7% of the suitable/available land each decade. Activities associated with this intensity are both motorized and nonmotorized in nature.

MANAGEMENT AREA - 10c (Dispersed Semiprimitive Motorized Recreation, No Harvest)

This management area manages Forest lands for their dispersed semiprimitive motorized recreation opportunities and wildlife habitat, as well as for other multiple uses and resources. Programmed timber harvest is not permitted within this management area. Timber harvest may be permitted to enhance recreational use within the area. Activities associated with this management area are both motorized and nonmotorized in nature.

MANAGEMENT AREA - 10d (Dispersed Semiprimitive Nonmotorized Recreation)

This management area manages Forest lands for their dispersed semiprimitive nonmotorized recreation opportunities, wildlife habitat, and timber resource values as well as for other multiple uses and resources. Timber harvest in this management area would occur at a maximum rate of 5% of the suitable/available

land each decade. Recreation activities associated with this management area are exclusively nonmotorized and nonmechanical in nature.

MANAGEMENT AREA - 10e (Dispersed Semiprimitive Nonmotorized Recreation, No Harvest)

This management area provides for the management of Forest lands for their dispersed semiprimitive nonmotorized recreation opportunities and wildlife habitat as well as for other multiple uses and resources. Programmed timber harvest is not permitted within this management area. Recreation activities associated with this management area are exclusively nonmotorized and nonmechanical in nature.

MANAGEMENT AREA 10f (Lakeside Habitats)

This management area provides for the management of Forest lakeside areas for their wildlife habitat, recreational and scenic values. Access within and through the areas would be limited to existing roads and trails. Programmed timber harvest is not permitted. Facilities development for recreation would be limited to that necessary for site protection and would be compatible with wildlife habitat objectives.

Scenic

These management areas provide for management of the Forest landscape for its value as a scenic resource as well as for other multiple uses and resources. A broad range of silvicultural practices is permitted.

MANAGEMENT AREA - 11a (Scenic Modification - Middleground)

Management of the area provides that activities within middleground zones of visually sensitive landscapes, as viewed from major travel corridors and use areas, may visually dominate the landscape but must borrow from natural characteristics in the surrounding area. The size and configuration of harvest areas must conform to standards for meeting the modification middleground Visual Quality Objective.

MANAGEMENT AREA - 11b (Scenic Modification - Foreground)

Management of the area provides that activities within foreground zones of visually sensitive landscapes, as viewed from major travel corridors and use areas, may visually dominate the landscape but must borrow from natural characteristics in the surrounding area. The size and configuration of harvest areas must conform to standards for meeting the modification foreground Visual Quality Objective.

MANAGEMENT AREA - 11c (Scenic Partial Retention - Middleground)

Management of the area provides that activities within middleground zones of visually sensitive landscapes, as viewed from major travel corridors and use areas, may be evident but must remain visually subordinate. The size and configuration of harvest areas must conform to standards for meeting the partial retention middleground Visual Quality Objective.

MANAGEMENT AREA - 11d (Scenic Partial Retention - Foreground)

Management of the area provides that activities within foreground zones of visually sensitive landscapes, as viewed from major travel corridors and use areas, may be evident but must remain visually subordinate.

The size and configuration of harvest areas must conform to standards for meeting the partial retention foreground Visual Quality Objective.

MANAGEMENT AREA - 11e (Scenic Retention - Middleground)

Management of the area provides that activities within middleground zones of visually sensitive landscapes, as viewed from major travel corridors and use areas, would not be visually evident to many observers. The size and configuration of harvest areas must conform to standards for meeting the retention middleground Visual Quality Objective.

MANAGEMENT AREA - 11f (Scenic Retention - Foreground)

Management of the area provides that activities within foreground zones of visually sensitive landscapes, as viewed from major travel corridors and use areas, would not be visually evident to many observers. Configuration of harvest areas must conform to standards for meeting the retention foreground Visual Quality Objective.

Developed Recreation

MANAGEMENT AREA - 12a (Developed Recreation Area, Public-Existing and Proposed)

This management area includes areas of land where physical improvements have been provided for a range of developed recreation opportunities as well as lands that are reserved for future study and potential development for a variety of developed recreation facilities.

MANAGEMENT AREA - 12b (Developed Recreation Area, Private-Existing or Proposed)

This management area includes areas of the Forest that are currently under special use permits or have potential as special use sites. Sites under special use permits with facilities, services, and opportunities provided by the private sector would be maintained according to the terms of individual special use agreements.

Special and Administrative Uses

MANAGEMENT AREA - 13a (Long-term Special Use Sites)

This management area applies to those lands where an existing major, long- term special use is currently under permit. These are generally non-recreational facilities such as repeater stations.

MANAGEMENT AREA - 13b (Forest Administrative Sites)

This management area is applicable where facilities and/or resources for the protection, administration, or management of the Forest are provided and maintained.

General Forest

MANAGEMENT AREA - 14a (General Forest)

This management area emphasizes sustained production of timber while meeting multiple use objectives for other resources as outlined in Forest-wide standards and guidelines. In most areas an extensive road network would be required to facilitate the objectives of this management area. Each management

intensity, applied to suited forest land, within this management area represents a specific set of practices, standards, and guidelines which are responsive to individual site capabilities, and include a full range of silvicultural systems and harvest methods.

MANAGEMENT AREA - 14b (General Forest, Deferred)

This area includes approximately 600 acres near Hardesty Mountain on the southwest side of the Forest. No timber harvest is programmed from this area for the planning period to allow additional studies of the relationship of the area to Management Area 5b. Silvicultural activities other than harvesting would occur as needed to meet sustained yield objectives of Management Area 14a.

Riparian

MANAGEMENT AREA - 15 (Riparian)

This management area is applicable to rivers, streams, small wetlands, lakes and the adjacent riparian areas. The emphasis in this area is to maintain the role and function of riparian areas in the overall landscape ecology. Activities within this management area vary by alternative, with no programmed timber harvest is permitted in Alternatives W and L; some harvest along Class III streams in Alternative D; and the MR prescription would be applied in Alternatives NC, K, A, and J. The MR prescription is described in the standards and guidelines of FEIS Appendix D.

MANAGEMENT AREA ADJUSTMENTS, Alternative L

Alternative L, developed with input from Oregon Natural Resources Council, uses several management area prescriptions that vary from the preceding descriptions. Although the specific emphasis for some of the prescriptions in Alternative L differ from the management area prescriptions in other alternatives, the modelling constraints and ultimate effects on other resources are similar in many cases. To make the analysis of Alternative L comparable with the other alternatives, the prescriptions unique to Alternative L for a particular emphasis were evaluated by the IDT for similarities of constraints and effects with existing management area prescriptions. Once similarities were identified, the management area prescriptions in Alternative L were correlated to the existing management area prescriptions and descriptions for comparability in mapping and modelling. In a few management areas the maximum allowable harvest rates by decade were adjusted to meet the intent of Alternative L.

The management area adjustments used to model Alternative L were:

Alternative L	**Management Area Used**
Wilderness-Recommended	1c
Wilderness-Study	1c
Old Growth Reserve	7
Old Growth Management	7
Old Growth Replacement	11f
Wildlife Habitat-Critical	9d
Wildlife Habitat-Sensitive	9d
Watershed-Critical	10c
Watershed-Sensitive	10b
Riparian Reserve	15

Riparian Management	11f
Rehabilitation-Natural	10b
Rehabilitation-Enhancement	10c
Back Country	10e
Scenic Preservation	10c
Timber Management-Extensive	11a
Timber Management-Intensive	14a
Mixed Rotation-No Harvest	7
Mixed Rotation-160 years	11e
Mixed Rotation-80 years	11c
Wild Lakes	10f

Following is a brief description of the general emphasis and intent of the management areas unique to Alternative L.

Wilderness Recommendation (149,203 acres) - Lands that the Forest Service would recommend to Congress for Wilderness classification.

Wilderness Study Areas (20,178 acres) - Areas which would be studied intensively for their Wilderness attributes and characteristics. Generally includes lands with potential Wilderness quality, which require study before appropriate boundaries and recommendations can be determined. Road closures and certain types of rehabilitation could be considered in the study. The actual study would be a separate document from the Final Forest Plan, to be compiled and scrutinized during the life of the Forest Plan itself. The decision as to final allocation would then occur in the "next" Forest Plan. These areas would be managed in their existing condition, and removed from the commercial forest land base.

Wild Lakes (341 acres) - Similar to Back Country for standing water bodies which, because of surrounding development, are not eligible for inclusion in larger Back Country or Wilderness Recommendation allocations. Keeps lakes in status quo or better conditions such as by prohibiting motorized traffic. In general, no additional development or access.

Old-Growth Reserve (136,555 acres) - Specific areas for no-cut management. The old-growth forest would age naturally. The Reserve can be any size and can include Spotted Owl Habitat Areas.

Old-Growth Management Areas (15,102 acres) - Long-rotation management areas, where 10-20% of the potential yield is expected. At least 3/4 of the entire area must actually be in an old-growth forest condition (250 years plus) at any one time. Areas not currently meeting this criteria can be allowed to grow into the desired condition. Cutting would be either by clearcutting (patch-cutting) small areas (40 acre maximum), or by selective systems. Helicopter and balloon systems preferred, with minimal road networks. Roads to be closed after sales.

Old-Growth Replacement - Extended Rotations (98,075 acres) - Long rotation management areas located in blocks of old-growth larger than 300 acres. The timber would be managed on 80 and 160 year rotations, with enough trees at 240 years old to provide functional Old Growth characteristics.

Wildlife Habitat - Critical Areas (192 acres) - Designation which emphasizes the critical nature of these areas in terms of survival cover, winter range, etc, by minimizing disturbance. Timber cutting is not programmed, and very few circumstances would require or allow any cutting at all. No new roads; existing roads may or may not be closed, either within the specific land use allocation decision or later as a consequence of its management plan.

Wildlife Habitat - Sensitive Areas (40,911 acres) - Same as Wildlife Habitat-Critical but applicable in areas where habitat conditions allow some disturbance. Some timber cutting allowed. About 10-15% of potential yield can be expected. No new roads, and road closures may be appropriate.

Watershed - Critical Areas (6,484 acres) - Designation which emphasizes the critical nature of these areas in terms of unstable soils, by minimizing disturbance. Timber cutting is not programmed, and very few instances would require or allow any cutting at all. No new roads; existing roads may or may not be closed, either within the specific land use allocation decision or later as a consequence of its management plan.

Watershed - Sensitive Areas (3,541 acres) - Same as Watershed Critical, but applicable in areas where watershed allows some disturbance. Some timber cutting allowed. About 10-15% of potential yield can be expected. No new roads, and road closures may be appropriate.

Riparian Reserve (3,903 acres) - Streamside areas which would be provided maximum protection by a no-cut, no roads allocation. Can be of any size. Usually would designate at least 250 feet on either side of stream. Adjacent developed land must be "feathered."

Riparian Management Areas (11,945 acres) - Streamside areas with a 100 foot no-cut buffer, (each side of the stream) then 200 feet at 25% yield. Riparian values, including large woody materials and largest conifers, would remain intact. Managed adjacent lands would be feathered to minimize blowdown. The remaining acres of riparian areas are distributed throughout other management areas which have no scheduled timber harvest.

Rehabilitation - Natural (30,587 acres) - Developed lands which would be allowed to revert to a natural condition by simply leaving them alone. May be used to simply recover that site, or help block up a larger expense of otherwise undeveloped, natural land.

Rehabilitation - Resource Enhancement (4,266 acres) - Same as Rehabilitation - Natural, except that more active on-the-ground management for watershed or wildlife habitat improvement. Especially appropriate for devastated pieces of ground where erosion is a serious factor or threat. Examples of activities would be extensive plantings, burning, and gabions.

Backcountry (88,797 acres) - Administratively-protected "wild" areas, which would be managed as Wilderness, but usually excluding grazing and mining. All other multiple uses (except logging) such as wildlife, fisheries, watershed, outdoor recreation, education, and research would be allowed and encouraged. No roads, and usually no ORVs. Proposed management activities following catastrophic evens would be carefully evaluated at the time. Catastrophic entry permitted, but only after careful scrutiny and approval.

Scenic Preservation Areas (27,324 acres) - For the most sensitive visual zones. This allocation allows no programmed harvest, and cutting can occur only in rare situations where safety or visual quality can indeed be improved. Must meet Forest Service Visual Quality Objective (VQO) of Preservation.

Extensive Timber Management Areas (36,474 acres) - Lands dedicated primarily to timber production, but without investments of intensive management techniques other than replanting and thinning. Yield of 85-95% is anticipated.

Intensive Timber Management Area (182,414 acres) - Similar to extensive, but applicable to lands dedicated to timber production. Intensive management techniques include genetic manipulation, more intensive thinning and replanting, irrigation, fertilization, and other methods, if proven to be cost-effective.

Mixed Rotation Management Areas (322,872 acres) - Old Growth islands of 80-300 acres comprise about 20% of this management area and are subject to no harvest. Another 20% provides connecting corridors between old-growth blocks and are managed on 160 year rotation. The remaining 60% of the area would continue on 80 year rotations, with a 10% reduced yield to provide structural old-growth characteristics that carry over into the next rotation.

Timber

Timber Resource Management Information - Management of the timber resource differs by alternative, depending on the mix of suited acres within management areas that allow timber harvest. Management areas with programmed timber harvest are: General Forest; scenic Retention, Partial Retention and Modification; Dispersed Recreation; and Scenic and Recreation Rivers. General Forest provides for the highest level of timber outputs, bound only by broad, watershed level constraints for dispersion, wildlife habitat and water quality. The other management areas emphasize nontimber resource values (e.g., scenic quality and recreation) resulting in lower levels of timber output. The acres allocated by management area are shown in Table II-3.

Lands suitable for timber production are the base from which the Allowable Sale Quantity (ASQ) is calculated. While trees can be cut and removed from some lands unsuitable for timber production in certain specific cases (e.g., to provide forage), the amount does not contribute to the ASQ. Additional volume not reflected in the ASQ includes cull and salvage material. The total timber sale program for the Forest is referred to as the Timber Sale Program Quantity (TSPQ).

The Forplan analysis and projections for future timber outputs use cubic volume measure. Historic volume data and volumes projected for harvest by alternative in the next decade are also displayed in board foot measure. An industry-wide transition from board foot to cubic measure is expected within the next decade, so volumes are shown in board feet for only the first decade. As the mix of species and size classes harvested varies over time, the board foot volume varies even though the cubic volume remains constant. The board foot/cubic foot ratio will decline over time as the average diameter of stands harvested becomes smaller. Alternative W harvests a constant 87 MMCF per year for the first five decades, while the resulting board foot volume declines from 491 MMBF in decade 1, to 440 MMBF by decade 5. This trend occurs under all alternatives.

Timber resource inventory and management data are presented in Table II-4; (note that an explanation of the columns in the display is provided in the following paragraphs). This display is followed by discussions of land suitability for timber production, timber volumes offered for sale, long-term sustained yield, silvicultural activities, and comparisons with the current Plan.

Table II-4 and the following narrative provide an understanding of how and why differences in timber resource data occur and their interaction with other resources as objectives vary from alternative to alternative.

Table II-4. Timber Resource Management Information

	Suitable Lands	Inventory			1st Decade Average Annual ASQ			LTSYC			Average Annual Net Growth		
		Begin	Begin/ Ac	End									
Benchmark or Alternative	M Acres	MMCF	CF	MMCF	MMCF	% Col.2	MMBF	MMCF	% Col.4	Decade	CF/Ac Begin	CF/Ac Dec5	MMCF Dec5
Benchmark	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
Max Timber	928.0	5,180.8	7,376	3,694.5	121.5	2.3%	673	126.4	3.4%	7	81	132	122.3
Max PNV	918.8	5,173.0	7,373	3,678.1	120.1	2.3%	684	120.2	3.3%	15	77	119	109.6
Alternatives													
NC (No Change) [3]	1,064.6	NA	NA	NA	146	NA	810	146	NA	1	NA	NA	NA
K	932.8	5,076.7	7,430	4,212.4	117	2.3%	650	120.0	2.8%	98% [2]	91	123	112
A	874.3	4,743.2	7,455	3,976.6	110	2.3%	608	113.5	2.9%	15	84	122	105.9
J	853.4	4,435.6	7,534	4,005.1	95	2.1%	530	107.8	2.7%	9	97	125	102.8
W	774.6	3,813.3	7,301	3,147.5	87	2.3%	491	94.7	3.0%	13	90	124	88.9
D	719.4	3,428.4	6,890	3,329.6	86	2.5%	476	93.8	2.8%	98%	97	127	91.0
L	553.1	1,635.3	6,974	2,335.2	27	1.7%	150	34.2	1.5%	97%	57	103	33.9

	Area and Percent of Suitable Land by Yield Level						1st Decade			
	Full Yield		50-94% Yield		Under 50% Yield		Clearcut	Shelterwood/Seed Tree	Selection	Harvest Total
Benchmark or Alternative	M Ac	% Col.(1)	M Ac	% Col.(1)	M Ac	% Col (1)	M Acres	M Acres	M Acres	% Col (1)
Benchmark	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)
Max Timber	885.3	95%	42.7	5%	0	0	123	9	0	14%
Max PNV	876.5	95%	42.3	5%	0	0	122	9	0	14%
Alternatives										
NC (No Change)	918.7	86%	145.9	14%	0	0	134	10	0	14%
K	797.0	85%	135.8	15%	0	0	117	9	0	14%
A	743.4	85%	130.9	15%	0	0	113	8	0	14%
J	719.6	84%	133.8	16%	0	0	95	7	0	12%
W	689.2	89%	85.4	11%	0	0	85	6	0	12%
D	638.9	89%	80.5	11%	0	0	92	7	0	14%
L	314.3	57%	163.9	30%	74.9	13%	31	2	0	6%

Existing Timber Management Plan

Data from the Timber Management Plan (TMP):

a. Potential yield in cubic feet and board feet: 850.4 MMBF (156 MMCF @5.45). This includes 53 MMBF of salvage.
b. Average annual net volume sold during years TMP was in effect: 623 MMBF (77-89), (114 MMCF @5.45).
c. Total acres of standard, special, and marginal lands used to develop the potential yield: 1,064,616 Acres.

[1] Tentatively suitable lands for all Alternatives, except NC: 1,032,100 acres, with a present inventory of 5,835 MMCF.
[2] Percent of long-term sustained yield (LTSY) reached by end of planning horizon (decade 15).
[3] NA = Data Not Available; could not be reasonably estimated, or compared to other alternatives, since Alternative NC (No Change) is based on a significantly different set of assumptions than the other alternatives, and could not be modeled with the current Forest FORPLAN model. Section D4b, of Chapter II in the DEIS describes these differences.

Column 1 -- The suitable acres displayed here reflect the difference in land allocations between Alternatives. Alternative NC represents the Current TM Plan and differs from the other Alternatives and benchmarks in managing 125,000 acres of marginal land for full yield and includes no consideration of MRs. This marginal category is no longer used, most of it becoming "unsuited" in the new landbase classification. The other Alternatives are compared as follows: With a few minor exceptions (old-growth groves, research natural areas, etc.), variation in total suitable acres is a function of roadless recreation and wildlife habitat areas. Suitable acres decline from Alternative K, to A, to J and W, due to additional acres in roadless areas. The decline continues from D to L as more roadless areas and Spotted Owl Habitat Areas are added.

Columns 2, 3, and 4 -- The beginning inventory (2) is proportionate to suited acres. The beginning volume/acre (3) increases from Alternative K, to A, to J as low volume/acre roadless areas are removed from the base. From this point the volume/acre decreases to W, L, and D as riparian areas, additional roadless areas, and Spotted Owl Habitat Areas, with higher volumes per acre are removed, thus reducing the volume/acre on the remaining timber base. Alternative L includes a greater proportion of high volume/acre stands than D.

The inventory volume at the end of 150 years (4) is a function of the suitable acres, age class distribution, and management intensities. The Alternatives are generally in the order of suitable acres except for J and D which include different mixes of age classes and management intensities, resulting in slightly more ending inventory volume than the number of suited acres would suggest.

Columns 5, 6, and 7 -- The first decade ASQ (5 & 7) is highly dependent on the size of the suitable landbase. Alternative K has the highest ASQ followed by A, J, W, D, and L. The ASQ as a percent of the beginning inventory (6) depends on the mix of rotation ages which are a function of species and management intensity. Most of the alternatives are at about 2.3%, but J and L, with higher proportions of long-rotation management areas are at 2.1 and 1.7% respectively.

Columns 8, 9, and 10 -- The LTSYC (8) is generally a function of suitable acres, species (as a surrogate for site index), and management intensity. The order of the alternatives is the same as for suited acres. As a percent of the ending inventory (9), LTSYC follows about the same pattern as ASQ % of the beginning inventory in Column 6. Alternatives J and L, with less intensive management due to the higher proportion of long-rotation management areas, harvest a smaller percentage of the ending inventory. Most alternatives reach LTSYC by the 15th decade (10), but three alternatives (K, D and L) fall short by 2 to 3%, due to age class distributions which are still uneven. Alternative NC avoids future volume shortages associated with uneven age class distributions by harvesting over half the ASQ volume in commercial thinnings in the fifth decade and beyond, so that first decade ASQ is equal to LTSYC.

Columns 11, 12, and 13 -- The average annual net growth per acre at the present time (11) is mostly a function of site index and age class on the suited landbase. Five decades in the future (12), the growth rate increases dramatically as most of the existing mature and old growth stands have been replaced by young, fast growing stands. Alternative L has the least growth per acre because of the higher proportion of long-rotation lands, which delays the conversion from existing to managed stands. The total annual growth in the year 2030 (13), reflects the number of acres in the suited landbase.

Columns 14 to 19 -- In total acres of full yield (14), the alternatives follow the same order as total acres of suitable lands, but as a percentage of the suited lands (15), are more variable and depend on the objectives of the alternative. The reduced yield lands which range from 50% to 94% of full yield (16) have a similar pattern except for Alternative L which has a much higher

proportion of reduced yield lands. There are no suitable acres being managed at less than 50% of full yield (18), except in Alternative L which has management areas with rotations as long as 666 years.

Columns 20 to 23 -- The number of acres clearcut (20) are in the same order as the acres in the suited landbase and volume harvested. The only exception is Alternative D, which harvests a higher ratio of small sawtimber, giving it more acres than Alternative W. Regeneration harvest other than clearcut (21) assumes future use of shelterwood and seed tree cutting will be at about the same proportion (7%) as past use. The acres of selection harvest (22) are modeled at zero, although this option is available to be prescribed.

Based on the percent harvested in the first decade (23), the various alternatives would take about 63 to 100 years to cut over the suitable landbase. The actual time will be longer because of harvest rate constraints, which on some areas require a rotation age of up to 666 years, and the increasing amount of commercial thinning volume which will reduce the number of clearcut acres in future decades.

Suited Acres - Table II-5 compares suited lands and timber yield categories by Alternative. There are 1,032,318 acres on the Forest that are tentatively suitable for timber management (See Chapter III, Timber). Removal of 85,513 acres necessary to meet management requirements (MRs) leaves a potential landbase for timber management of about 946,800 acres. The MR acres include Spotted Owl habitat (74,719 acres), and riparian areas that cannot be harvested due to steep and/or unstable soils (10,794 acres). Pine Marten and Pileated Woodpecker MRs are met in some alternatives by managing larger areas on long rotations, so these acres are still part of the potential landbase for timber management. Alternative K produces timber from 99% of the potential landbase, followed by A (92%), J (90%), W (82%), D (76%), and L (55%). Alternative NC which does not include MRs, and schedules harvest on 125,000 acres of "marginal" lands, has a suitable landbase of 1,064,616 acres, 12% greater than the potential landbase for the other alternatives.

Table II-5 also shows the breakdown of the suited acres by percent of full yield expected under the proposed management intensities. Also shown are the rotation ages that go along with the yield constraints. At full yield the rotations vary from 60 to 110 years, depending on species, access for commercial thinning, and response to fertilizer. The acres with 75 to 94% of full yield have 140 year rotations that result from harvest rate constraints that limit the amount of regeneration harvest to 7% of the suited acres per decade. The acres with 50 to 74% of full yield have 200 year rotations resulting from a harvest rate constraint of 5% per decade. Alternative L has additional constraints as low as 1.5% per decade, resulting in rotations as long as 666 years.

Table II-5. Comparison of Suited Timberlands

					Timber Yield Acres with Yield Reductions to Meet Other Resource Objectives					
Alternative	Acres with Timber Yield	% of Tent. Suited -MRs[1]	No Yield	% of Tent. Suited - MRs	Acres of Full Yield [2]	%	75-94% Full Yield	%	50%-74% Full Yield	%
NC (No Change)[3]	1,064,616	112%	0	0	918,657	86%	54,000	5%	91,959	9%
K	932,813	99%	13,992	1%	796,974	85%	70,306	8%	65,533	7%
A	874,291	92%	72,514	8%	743,451	85%	71,236	8%	59,604	7%
J	853,398	90%	93,407	10%	719,610	84%	72,556	9%	61,232	7%
W	774,608	82%	172,197	18%	689,229	89%	42,870	6%	42,509	5%
D	719,439	76%	227,366	24%	638,929	89%	40,425	6%	40,085	5%
L	553,090	58%	393,715	42%	314,299	57%	74,857	14%	163,938[4]	29%
Rotation Age					60-110 years		140 years		200 years	

[1] Suited acres minus MRs = Total Forest acres (1,675,407) - nonforest acres (146,153) - withdrawn acres (327,501) - roads and unsuited acres (169,615) = 1,032,138 acres tentatively suited - acres required for resource management objectives (36 CFR 219.14 (c)) which preclude timber production (85,513) = 946,805 acres.

[2] Full yield is that developed in a yield simulator, less operational falldown, without further reductions for other resource considerations, and available for harvest at CMAI (or 95% CMAI).

[3] Alternative NC has the same land allocations as Alternative A (No Action) but is based on different land suitability standards and does not include MRs. It also assumes the necessary budget, workforce and technology will be available to produce full timber yields from 125,000 acres of "marginal" land.

[4] This table includes 74,941 acres that are managed on rotations of 330 to 660 years, with timber outputs that are less than 50% of full yield.

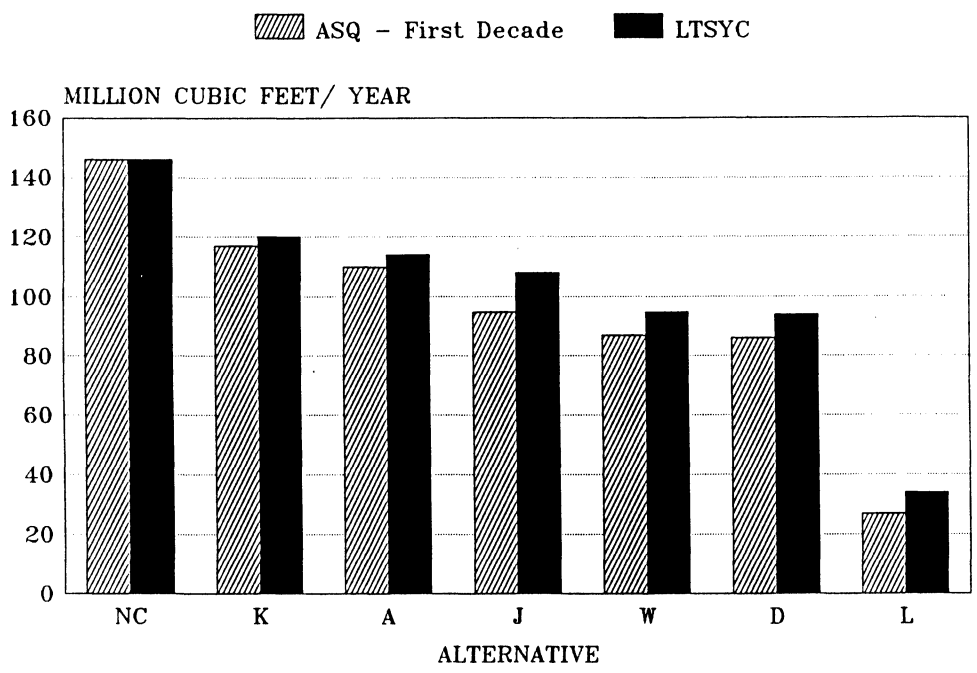
Volume - Timber volumes are measured in several different ways to reflect different aspects of the timber program. The Allowable Sale Quantity (ASQ) measures the amount of sound, green or recently dead wood that can be sold in a decade, and is the amount used for controlling the Forest's timber sale program. The ASQ is calculated in cubic feet using FORPLAN. The cubic foot measurement is used because it is a more accurate measure of total merchantable volume, especially over the long term. It reflects the increasing utilization of the tree much better than is possible with board foot measures. The long-term sustained yield capacity (LTSYC) is also measured in cubic feet and calculated using FORPLAN. Alternative NC, developed under the current plan, used a computer program called Timber RAM (Resource Allocation Method) to calculate ASQ and LTSYC.

Long-term sustained yield capacity measures the amount of volume that can be grown and harvested on a sustained basis from future stands. Figure II-1 displays the long-term sustained yield capacity and ASQ in cubic feet for the alternatives. In addition to the ASQ, volume from cull material, salvage sales, and miscellaneous materials and products is also sold by the Forest. This additional volume was determined by averaging the annual volumes from the past decade. The total volume sold, including the ASQ, is termed the Timber Sale Program Quantity (TSPQ). Figure II-2 displays the TSPQ and ASQ in board feet for the alternatives. Firewood availability is measured by the potential cords of

available cull material from timber sales. Figure II-3 shows the potential firewood available for the Alternatives.

All four of these measures follow the same pattern in the alternatives, and vary directly with the number of suitable acres. Alternative NC, with the largest landbase, has the highest ASQ, TSPQ, LTSYC and most cords of firewood available. Alternative K has the next highest levels of outputs, followed in order by Alternatives A,J,W,D and L.

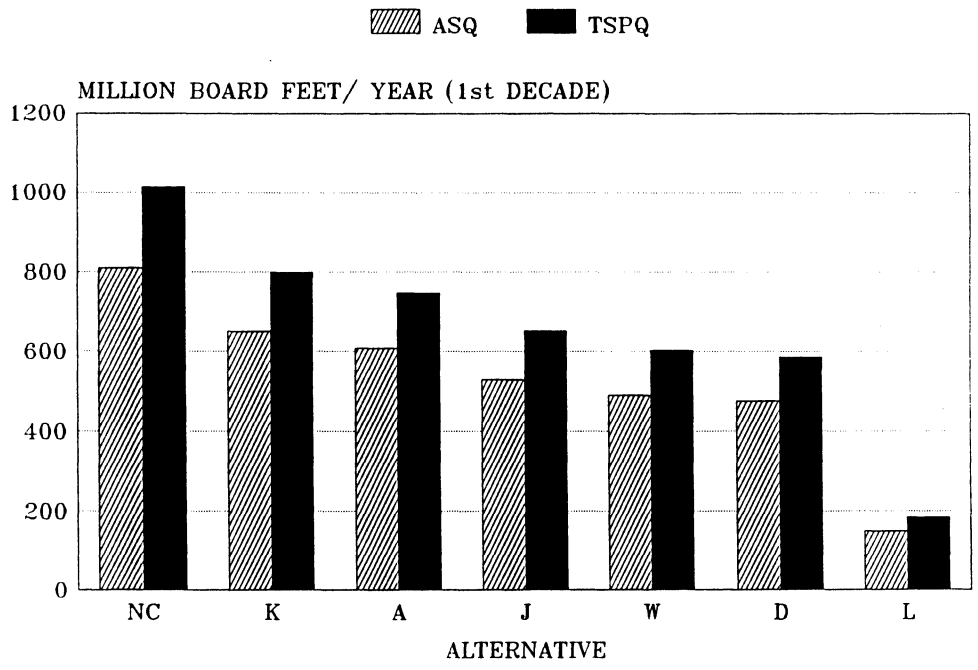
Figure II-1. Allowable Sale Quantity and Long-term Sustained Yield Capacity



	Alternatives						
	NC	**K**	**A**	**J**	**W**	**D**	**L**
ASQ [1] - 1st Decade (MMCF)	146	117	110	95	87	86	27
LTSYC [2] (MMCF)	146	120	114	108	95	94	34

[1] Allowable Sale Quantity
[2] Long-term sustained yield capacity

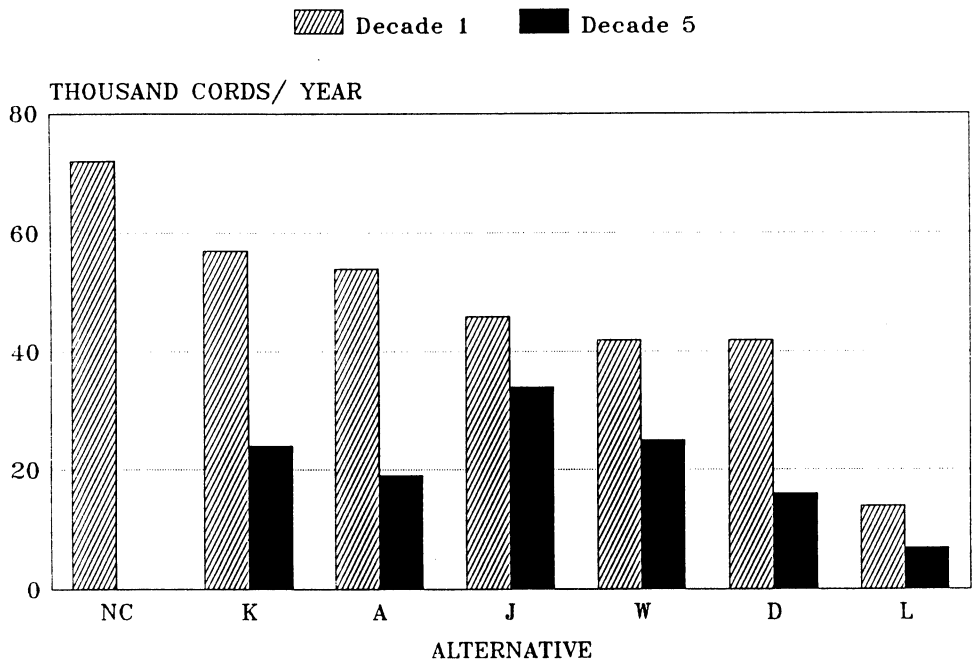
Figure II-2. Allowable Sale Quantity and Timber Sale Program Quantity



	Alternatives						
	NC	**K**	**A**	**J**	**W**	**D**	**L**
ASQ [1] (MMBF)	810	650	608	530	491	476	150
TSPQ [2] (MMBF)	1,013	799	748	652	604	586	185

[1] Allowable Sale Quantity
[2] Timber Sale Program Quantity

Figure II-3. Potential Firewood Availability [1]



	Alternatives							
Unit of Measure	**Decade**	**NC**	**K**	**A**	**J**	**W**	**D**	**L**
MCORDS/yr	1	72	57	54	46	42	42	14
MCORDS/yr	5	NA[2]	24	19	34	25	16	7

[1] Projections for firewood supply are based on historical proportions of cull volume used as firewood and do not include the piling unmerchantable material (PUM) or other potential sources such as precommercial thinning slash.
[2] NA= Data Not Available; could not be reasonably estimated, or compared to other Alternatives, since Alternative NC (No Change) is based on a significantly different set of assumptions than the other Alternatives, and could not be modeled with the current Forest FORPLAN model. Section D4b, of Chapter II in the DEIS describes these differences.

Silvicultural Activities - A mix of silvicultural treatments is applied to the acres which are suited for timber management. The silvicultural activities used in the alternatives include reforestation, release, precommercial thinning, fertilization, commercial thinning, and regeneration harvest. The difference between alternatives is the number of acres to which these treatments are applied, which reflects the number of suitable acres and how many are accessible for commercial thinning. These activities are displayed in Table II-6.

Table II-6. Annual Silvicultural Treatments

		Alternatives						
Treatment (M Acres)	**Decade**	**NC**	**K**	**A**	**J**	**W**	**D**	**L**
Regeneration Harvest and Reforestation	1	14.4	12.6	12.1	10.2	9.1	9.9	3.3
	5	NA[1]	11.8	11.6	8.2	8.1	8.5	2.3
Release	1	2.2	2.5	2.4	2.0	1.8	2.0	0.7
	5	NA	2.4	2.3	1.6	1.6	1.7	0.5
Precommercial Thinning	1	10.7	8.6	9.5	6.6	6.7	7.1	1.8
	5	NA	9.2	8.7	7.3	6.8	7.0	2.3
Fertilization	1	0	10.2	8.8	11.8	9.6	10.2	5.6
	5	0	10.1	10.7	7.7	7.3	6.8	2.6
Commercial Thinning	1	4.2	3.1	3.2	2.6	2.8	2.7	0.2
	5	NA	2.8	1.3	10.1	6.8	6.1	4.9

[1]NA = Data Not Available; could not be reasonably estimated, or compared to other Alternatives, since Alternative NC (No Change) is based on a significantly different set of assumptions than the other Alternatives, and could not be modeled with the current Forest FORPLAN model. Chapter II (Timber) in the FEIS describes these differences.

Comparison of Past, Present, and Projected Future Outputs - Table II-7 provides a comparison of the current Timber Management Plan potential yield, average volume sold, average volume cut, and the proposed alternatives for the Forest Plan. This table also breaks out the various components of the Timber Sale Program Quantity (TSPQ) for each of the alternatives.

Table II-8 compares the Forest situation from the Potential Yield of the Current Plan in 1977, to the No Action Alternative which incorporates NFMA regulations, and finally to the Preferred Alternative (W). The following discussion explains the differences found in these comparisons in two steps. The first step compares the Current Plan (Alternative NC) to the No Action Alternative (A) under NFMA, to highlight the changes due to implementation of the NFMA regulations. The second step compares the No Action Alternative to the Preferred Alternative (W), to highlight the changes in response to the issues facing the Forest today.

The potential timber yield of the Current Plan was 897 million board feet (MMBF) in 1977. This amount was amended twice to 850 MMBF due to the addition of new wilderness in 1980 and 1984. In addition, 40 MMBF of salvage was removed to provide comparisons based on net green volumes. This results in a Current Plan potential yield of 810 MMBF (Alternative NC). By comparison, the potential first decade yield for the Current Plan, as it would be implemented under the NFMA planning process, is 608 MMBF (Alternative A). The difference of 202 MMBF can be attributed to two factors: fewer acres suited for timber management; and less productivity per acre.

The biggest factor (72%) is the drop in suited acres from 1,064,616 to 874,290 which accounts for 145 MMBF at the average Forest productivity rate of 761 board feet per acre per year. The difference of 190,330 acres is due to changes in land suitability definitions, additional nonforest acres due to more detailed timber typing, and wildlife and riparian MRs.

The remaining factor (28%) is the reduction in Forest productivity. This is due to a combination of yield table differences and management intensities. The overall productivity dropped from 761 board feet/acre/year in the current TM Plan to 695 board feet under the new calculations, and accounts for a drop of 57 MMBF on 874,290 acres. Even though individual yield tables dropped by as much as 12% from those used previously, the loss was offset somewhat by the addition of fertilizer to stands with at least 60% Douglas fir.

The discussion thus far has examined the effects of implementing the Current Plan under the NFMA regulations. The second step is to compare the Current Plan under NFMA (Alternative A) with implementation of the Preferred Alternative (W). The Preferred Alternative allocates an additional 99,690 acres to no-harvest categories (e.g., riparian habitat, dispersed recreation, special interest areas, old-growth groves, and special wildlife habitat) to deal with the issues facing the Forest today. This amounts to a 69 MMBF drop in potential yield. There is also an additional 48 MMBF drop due to changes in management intensity. These changes reflect more restrictive harvest rate constraints to meet resource objectives. The total of 117 MMBF is the volume reduction from the Current Plan (NFMA) potential yield of 608 MMBF to the Preferred Alternative potential yield of 491 MMBF. The total drop from the Current Plan (1977) potential yield (810 MMBF) to the Preferred Alternative (491 MMBF) is 319 MMBF. About 63% of this total drop is due to implementing the NFMA regulations, and 37% is due to land allocation changes in the Preferred Alternative to deal with Forest issues (See Table II-8).

The Current Plan proposed harvest level, excluding salvage, was set at 605 MMBF per year in 1977 and reflected a lack of funding, work force, and technology to realize the full potential yield. This volume has been revised downward periodically to account for changes in the land base due to Wilderness, and increased periodically for the earned harvest effect of intensive management above the level planned. This earned harvest effect results from the accomplishment of more acres of intensive management (pre-commercial thinning, etc.) than was planned, which increases the amount of future volume available for harvest, and in turn, increases the volume that can be harvested now without violating non-declining yield. The earned harvest effect has more than offset the decreased land base and the most recent adjustment shows the proposed harvest for the Current Plan at 645 MMBF annually. The actual amount sold has averaged 623 MMBF (97%) and the amount harvested 538 MMBF (83%) from 1977 through 1989.

The reason the amount harvested was less than the amount sold was because of the 1980s recession. A severe depression of the housing market and a general slowdown in the economy caused timber prices and demand to decline sharply. Timber harvest on the Forest fell to 370 mmbf in 1982, the lowest level since 1952. In order to remain competitive, mills harvested only the lowest priced National Forest timber, and increased harvest on private lands. The average selling price on the Forest from 1977 to 1985 was $192/MBF. However, the value of the timber actually harvested over the same period was only $135/MBF. The private harvest level in the Eugene Timbershed went from 350 MMBF in 1980 to 500 MMBF in 1983, after declining steadily from 630 MMBF in 1972 (Oregon Department of Forestry). For the last three years (87,88 and 89) the volume harvested has exceeded the volume sold, but the planning period average remains about 17% less than the allowable harvest level.

The potential yield for the Preferred Alternative is also the ASQ. The potential yield for the Current Plan (810 MMBF) was never offered for sale. A major concern of some of the public is that we will

continue to offer significantly less than the potential yield. However, the Forest expects to sell 100% of the potential yield of the Preferred Alternative over the planning decade for the following reasons: (1) more accurate delineation of suitable timber land; (2) more realistic assumptions regarding silvicultural intensities; (3) more accurate calculations of harvest reductions to meet other resource goals; and (4) with more accurate planning, full funding is expected. When planning assumptions are correct, targets should be obtainable within the standards and guidelines. However, ASQ and annual targets are secondary to standards which will not be violated to achieve annual targets (Regional Forester, 2430/1920 Letter, March 22, 1990).

Managed Yield Tables - The following discussion provides more information about the difference in the managed timber yield tables between the Current Plan (Alternative NC) and the other alternatives. This difference results from the following changes in inventory techniques, yield models, management intensities, and philosophies (Knapp, 1983):

Inventory techniques -

Site tree selection - The previous inventory allowed selection of an appropriate tree outside of the plot area. The present inventory required selection of the site tree in the plot, resulting in a more accurate measure of site quality.

Site Index Conversion - The site indices from both inventories use McArdle's Douglas-fir site index based on 100 years total age. The DFSIM model used for construction of managed yield tables uses King's site index based on 50 years at breast height age. Conversion to King's site index is a source of minor difference.

Land Stratification - Under the Current Plan the Forest was stratified into working groups (based on species, age and site class) after the inventory. The new plan stratified the Forest before the inventory (by species and size class) and sampled each working group as necessary to achieve a sampling error of less than 10%. The effect of the different methods on Forest-wide ASQ is not known, but working group level yields are more accurate with the new inventory.

Table II-7. Comparison--Past, Present, and Alternatives Timber Outputs (MMBF)

Output	Existing TM Plan	1977-89 Annual Average Timber Sold/Cut	Alternatives						
			NC [1]	K	A	J	W	D	L
I. ALLOWABLE SALE QUANTITY (ASQ) -- The allowable sale quantity is composed of those volumes resulting from the yield projections of FORPLAN. ASQ is obtained from lands designated as suitable for timber production under NFMA standards, and meets the utilization standards in the Regional Guide. When sold, the volume is called "chargeable," and is used to determine achievement of planned allowable sale quality goals.									
Potential Yield [1]									
Green	797	623/538	797	634	594	517	479	465	147
Salvage	53		13	16	14	13	12	11	3
TOTAL Allowable Sale Quantity	850	623/538	810	650	608	530	491	476	150
II. OTHER SAWTIMBER -- Meets utilization standards in Regional Guide, but is not considered "chargeable" against the planned allowable sale quantity goals.									
A. Sawtimber from lands designated unsuitable for timber production--this volume is estimated based on the incidental volume of timber that will be sold from lands that are not designated for timber production.									
Green		2/2	2	2	2	2	1	1	1
Salvage									
TOTAL Sawtimber Volume From Unsuitable Lands		2/2	2	2	2	2	1	1	1
B. Dead sawtimber from lands that are designated suitable for timber production, but which was not included in yield tables.									
		24/20	29	22	21	18	17	16	5
TOTAL -- Other Sawtimber		26/22	31	24	23	20	18	17	6
III. SUBMERCHANTABLE VOLUMES FROM ALL LANDS -- The estimated timber volume that does not meet the utilization standards in the Regional Guide, but which could be utilized for products other than sawtimber. It is not considered "chargeable" against planned allowable sale quantity goals.									
Fuelwood		30/25	39	28	27	23	22	21	7
Other (including cull)		100/87	133	97	90	79	73	71	22
TOTAL Submerchantable Volume		130/112	172	125	117	102	95	92	29
TOTAL NET MERCHANTABLE SAWTIMBER (I + II)		649/560	841	674	631	550	509	493	156
TOTAL NONCHARGEABLE (II + III)		156/134	203	149	140	122	113	109	35
TIMBER SALE PROGRAM QUANTITY (I + II + III) -- The timber sale program quantity includes the allowable sale quantity for the 1st decade and estimated additional volume planned for sale during the 1st decade, such as fuelwood.									
		779/672	1013	799	748	652	604	585	185

[1]The assumptions that were used in the existing timber management plan to calculate potential yield differ from those that were used to calculate Allowable Sale Quantity. While potential yield represented a level that could be produced, allowable sale quantity represents a timber objective and program for achievement of planned levels. However, both the potential yield and allowable sale quantity do represent a ceiling on the amount of chargeable timber volume that could be sold for a given decade. In this context, the two terms are comparable.

Table II-8. Volume Comparison of Alternative NC, A, and W

Description	Potential Yield MMBF	Comments
Alternative NC (No Change)	897	Landbase = 1,125,500 acres (current Plan-1977 without NFMA Requirements)
Adjustments:		
Landbase	-10	French Pete Additions (1980) 15,000 acre reduction of suited land
	-37	Oregon Wilderness Act (1984) 45,880 acre reduction of suited land
Salvage	-40	Removes salvage volume
Alternative NC (No Change)(1984)	810	Potential yield. Includes only net green and salvable dead. Landbase = 1,064,620 acres.
Alternative A (No Action) (current Plan with NFMA Requirements)		
Adjustments:		
Landbase	-145	190,330 acre reduction for nonforest, unsuited and MRs
Forest productivity	-57	Reduction due to differences in yield tables and management intensities.
Alternative A (No Action)	608	Potential yield. 25% decrease represents the Current Plan land allocations implemented under NFMA. Landbase = 874,290 acres.
Alternative W (Preferred) (Proposed Forest Plan with NFMA Requirements)		
Adjustments:		
Landbase	-69	99,690 acre reduction for additional no-harvest allocations to deal with current Forest issues.
Forest productivity	-48	Additional drop from No Action Alternative due to more restrictive harvest rate constraints to meet resource objectives. This results in a 9% decrease in productivity.
Alternative W	491	Potential yield. This is a 19% change from the Current Plan under NFMA, (No Action). Landbase = 774,600 acres.

Managed Timber Yield Models - The Current Plan used the Managed Yield (MGYLD) computer program to make yield calculations. The new plan uses two models, DFSIM for low elevation timber types and Prognosis for high elevation types. Further discussion of timber yield models and yield table development can be found in Appendix B, Section C.5., and in the planning records. The major differences are summarized in Table II-9.

Table II-9. Comparison of Managed Timber Yield Models

	MGYLD	DFSIM, Prognosis
Height growth:	Increase of six Site Index points for stocking level control (PCT).	Both use height function for stocking level control.
Height curve:	Used McArdle's SI curves.	DFSIM uses Bruce's height curve which is generally lower than McArdle's in first half of rotation. Prognosis uses local height curve.
Average tree:	Assumed site index tree represented the stand average tree.	DFSIM uses a stand volume function and assumes the average tree is the tree of mean volume. For Prognosis, the average tree is less than the site index tree.
Model influences:	Volume is highly sensitive to timing and number of thinnings.	Volume is relatively insensitive to timing of thinnings, number of thinnings and initial stocking levels.

Management Intensity -

Precommercial Thinning (PCT) - The Current Plan assumed a 49% increase in yield for PCT. The new yield tables show an increase of 21% for PCT.

Commercial Thinning (CT) - The Current Plan allowed thinning on a 10 year cycle beginning at age 34 (9-inch d.b.h.), with up to six entries. As much as 41% of the suited landbase was scheduled for CT in a single decade.

In the Proposed Forest Plan, CT is constrained to a 20 year cycle beginning at age 47 (12-inch d.b.h.), with a maximum of two entries. The result is a maximum of 28% of the suited landbase scheduled for CT in any decade. These constraints are based on resource, economic and operational considerations that take into account impacts on other resources, reasonable expectations of work force, and funding situations.

Genetics - The Current Plan does not include an increase in yields for planting genetically superior stock. The new tables use a 10% increase for all working groups.

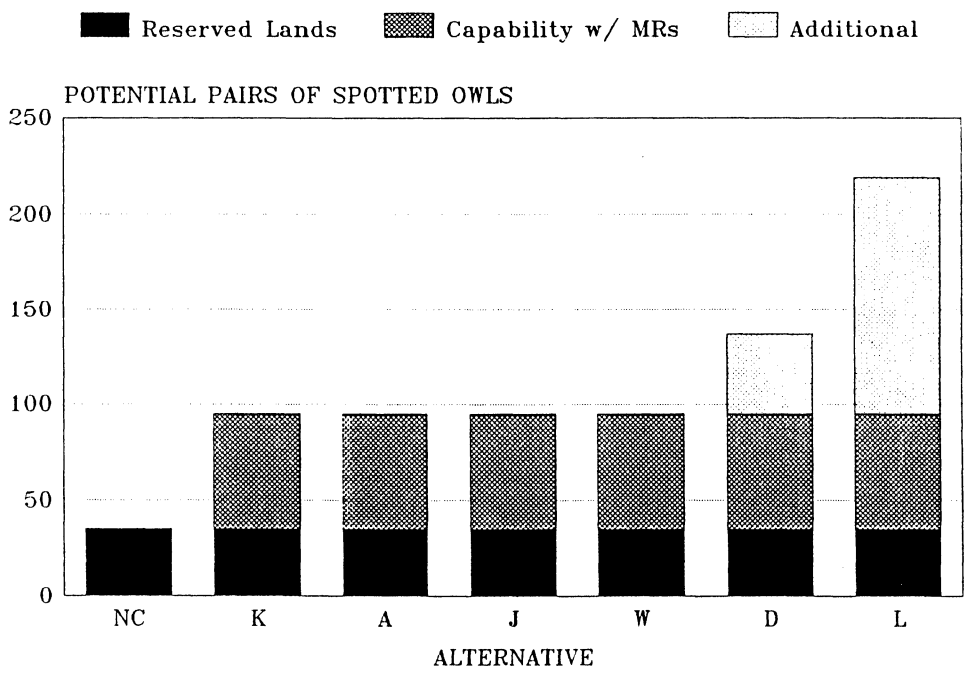
Fertilization - The Current Plan assumed fertilizer would not be available for use. The Proposed Forest Plan assumes fertilizer will be applied once (at the rate of 200 pounds of nitrogen/acre) to acres which are stocked with at least 60% Douglas fir. This represents about 80% of the suited landbase. Fertilizer increases yields by an average of 7% at culmination of mean annual increment.

Management Philosophy - During the development of the Current Plan, the emphasis was on what *could* we produce with a given level of management. In the Proposed Forest plan the question is what does the Forest anticipate *will* be grown in response to a certain level of management? The first perspective is on the *potential*, the second is on the *expected*.

Wildlife

Spotted Owl Habitat - The Management Requirement (MR) network of spotted owl habitat areas (SOHAs) will be maintained in all of the Forest Plan Alternatives except for the No Change Alternative. Alternatives D and L provide habitat capability above the MR level. All alternatives provide an equal amount of habitat capability for reserved lands. All land designated for protection of spotted owl habitat will be considered unsuited for timber production. Figure II-4 illustrates the habitat capability to support pairs of northern spotted owls provided in each alternative.

Figure II-4. Spotted Owl Habitat Capability

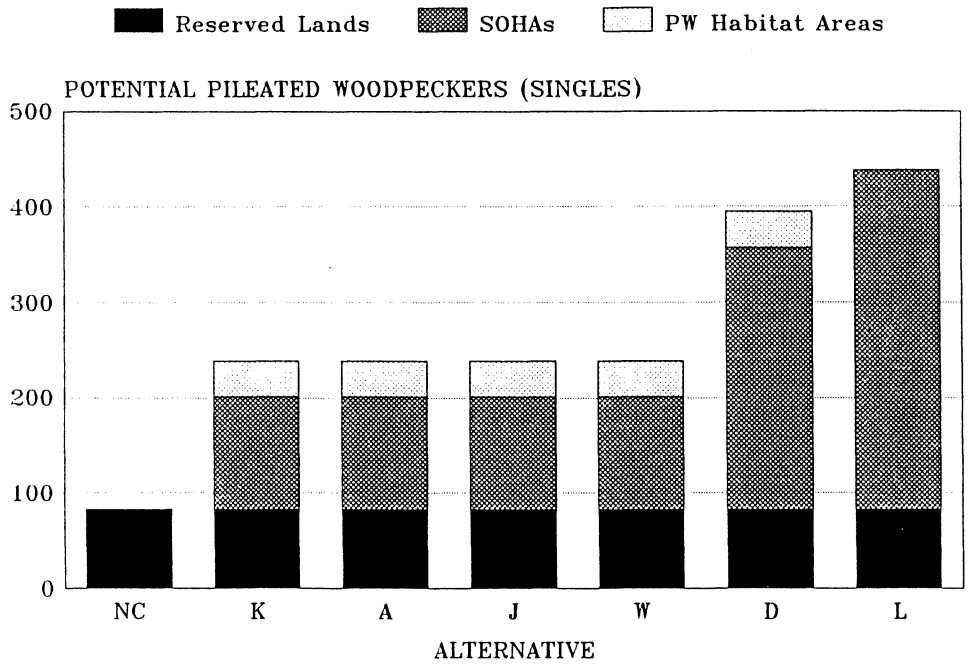


	Alternatives						
Pair Capability	**NC**	**K**	**J**	**A**	**W**	**D**	**L**
SOHA Level[1]	NA[2]	60	60	60	60	60	60
Additional Provided [3]	0	0	0	0	0	42	124
Capability in Reserved Lands[4]	35	35	35	35	35	35	35
TOTAL CAPABILITY IN PAIRS	35	95	95	95	95	137	219

[1]Verified pairs of spotted owls located within the MR SOHA network of 59 areas.
[2]NA = Data Not Available; could not be reasonably estimated, or compared to other Alternatives, since Alternative NC (No Change) is based on a significantly different set of assumptions than the other Alternatives, and could not be modeled with the current Willamette National Forest FORPLAN model. Section D4b, of Chapter II in the Draft EIS describes these differences.
[3]Verified pairs of spotted owls protected above MR levels; based on habitat capability in Alternative L and additional SOHA designation in Alternative D.
[4] Potential pairs of spotted owls based on capability in wilderness.

Pileated Woodpecker Habitat - Figure II-5 displays the long term habitat capability for pileated woodpeckers on the Forest by Alternative. The combination of reserved lands, spotted owl habitat areas, and pileated woodpecker habitat areas provide the quality, quantity, and distribution of habitat required to meet or exceed the Management Requirements for pileated woodpeckers in all alternatives except No Change. Habitat capability on reserved lands is the same for all alternatives.

Figure II-5. Habitat Capability for Pileated Woodpeckers[1]

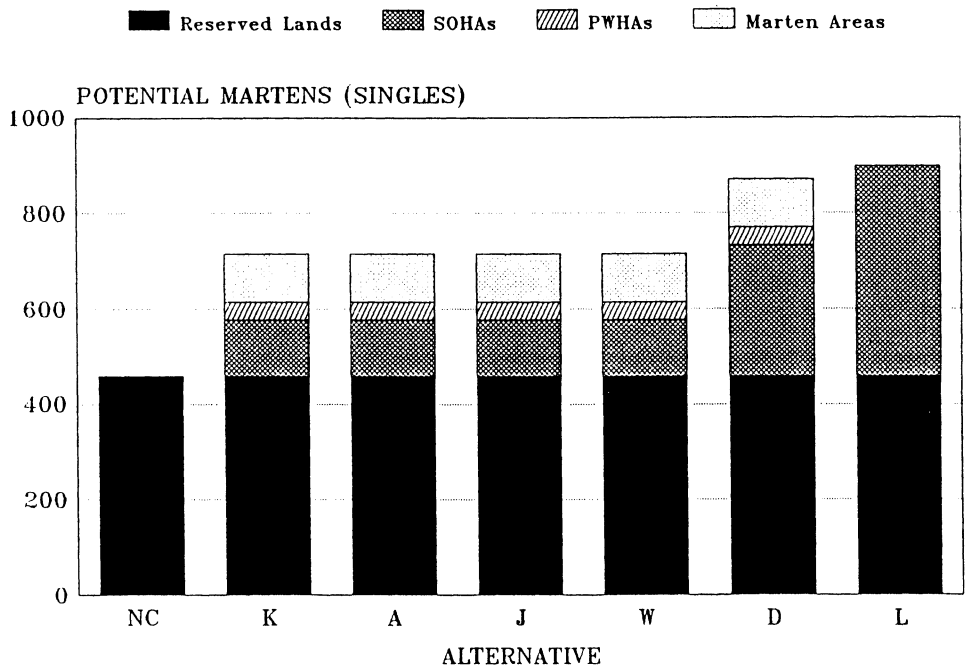


	Alternatives						
Habitat Capability	**NC**	**K**	**J**	**A**	**W**	**D**	**L**
Pileated Woodpecker Habitat Areas	NA[3]	38	38	38	38	38	--[2]
SOHAs	NA[3]	118	118	118	118	274	355
Reserved Lands	83	83	83	83	83	83	83
Total Habitat Capability	83	239	239	239	239	395	438

[1] Habitat capability is expressed as potential numbers of individual pileated woodpeckers.
[2] No specific allocation of pileated woodpecker habitat is needed to meet MR levels for habitat quality or distribution; capability is maintained by the existing condition.
[3]NA = Data Not Available; could not be reasonably estimated, or compared to other Alternatives, since Alternative NC (No Change) is based on a significantly different set of assumptions than the other Alternatives, and could not be modeled with the current Willamette National Forest FORPLAN model. Section D4b, of Chapter II in the Draft EIS describes these differences.

Marten Habitat - Marten utilize a broader range of habitat than either spotted owls or pileated woodpeckers. All vegetation series with mature and old-growth Forests are used as habitat. Marten habitat will be provided at or above Management Requirements in all the alternatives except for No Change. Because marten use similar mature and old-growth habitat as spotted owls and pileated woodpeckers, a combination of reserved lands, spotted owl habitat areas, pileated woodpecker habitat areas, and marten habitat areas will contribute to meeting Management Requirements. Habitat areas designated specifically for marten occur wherever quantity, quality, or distribution of habitat appear limited. All alternatives provide the same habitat capability within reserved lands. Figure II-6 displays the habitat capability for marten provided in each alternative.

Figure II-6. Marten Habitat Capability [1]



	Alternatives						
Habitat Capability	**NC**	**K**	**J**	**A**	**W**	**D**	**L**
Marten Habitat Areas	NA[3]	100	100	100	100	100	--
Martens in PWHAs	NA[3]	38	38	38	38	38	--
Marten in SOHAs	NA[3]	118	118	118	118	274	438
Marten in Reserved Lands	459	459	459	459	459	459	459
Total Habitat Capability	459	715	715	715	715	871	897

[1] Habitat capability for marten is expressed as potential population of individual martens.
[2] No specific allocation is needed to meet MRs for habitat quality, quantity or distribution.
[3]NA = Data Not Available; could not be reasonably estimated, or compared to other Alternatives, since Alternative NC (No Change) is based on a significantly different set of assumptions than the other Alternatives, and could not be modeled with the current Willamette National Forest FORPLAN model. Section D4b, of Chapter II in the Draft EIS describes these differences.

Bald Eagle Habitat - Five pairs of bald eagles are known to nest on the Forest. Bald Eagle Management Plans exist for two of these pairs. The areas included in the Management Plans are located near Hills Creek Reservoir and Lookout Point Reservoir. Existing Bald Eagle Management Plans must be revised and new plans prepared for all known nesting pairs during Forest Plan implementation regardless of the alternative selected. Management of all nesting pairs will comply with the Bald Eagle Recovery Plan. All alternatives consider lands within 1.1 miles of eleven major water bodies to be potential nest, roost, and forage sites for bald eagles. Table II-10 displays the Bald Eagle Recovery Plan objectives for the Forest as part of four alternatives, including the No Change Alternative. Additional sites have been designated in the remaining three alternatives.

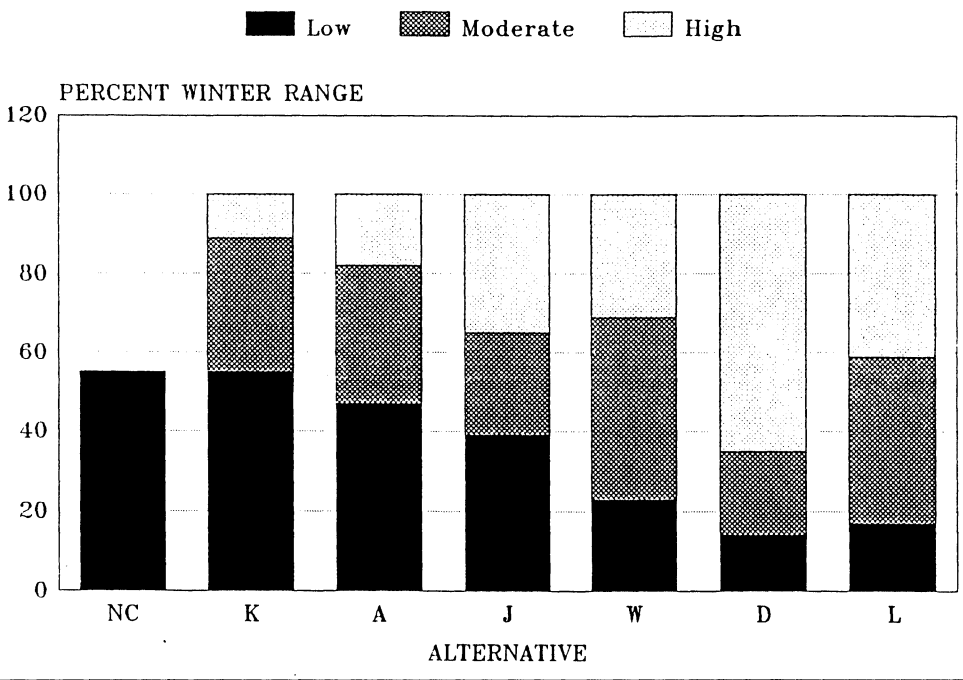
Table II-10. Bald Eagle Habitat

	Alternatives						
Acres of Habitat	**NC**	**K**	**J**	**A**	**W**	**D**	**L**
Existing BEMAs [1]	1472	1472	1472	1472	1472	1472	1472
Potential Nest Sites [2]	725	725	725	725	2250	3000	3000
TOTAL	2197	2197	2197	2197	3722	4472	4472

[1]These acres reflect nest, roost, and forage habitat designated through development of bald eagle management plans for Hills Creek and Lookout Point.
[2]Habitat identified is within 1.1 miles of major water bodies surveyed. Management plans are being developed for three known nest sites that are included in this category.

Deer and Elk - Habitat conditions on winter range are considered a limiting factor influencing survival of wintering deer and elk populations. The manaegment emphasis placed on winter range habitat effectiveness determines potential deer and elk populations. A total of 605,367 acres of winter range have been delineated on the Forest. Habitat objectives set for each level of management emphasis include summer range as well as winter range. Deer and elk populations occurring on the Forest are migratory, thus management of the entire range will be required to maintain healthy, productive populations. Figure II-7 displays the habitat effectiveness emphasis levels for winter range provided by each alternative.

Figure II-7. Optimal Cover on Deer and Elk Winter Range

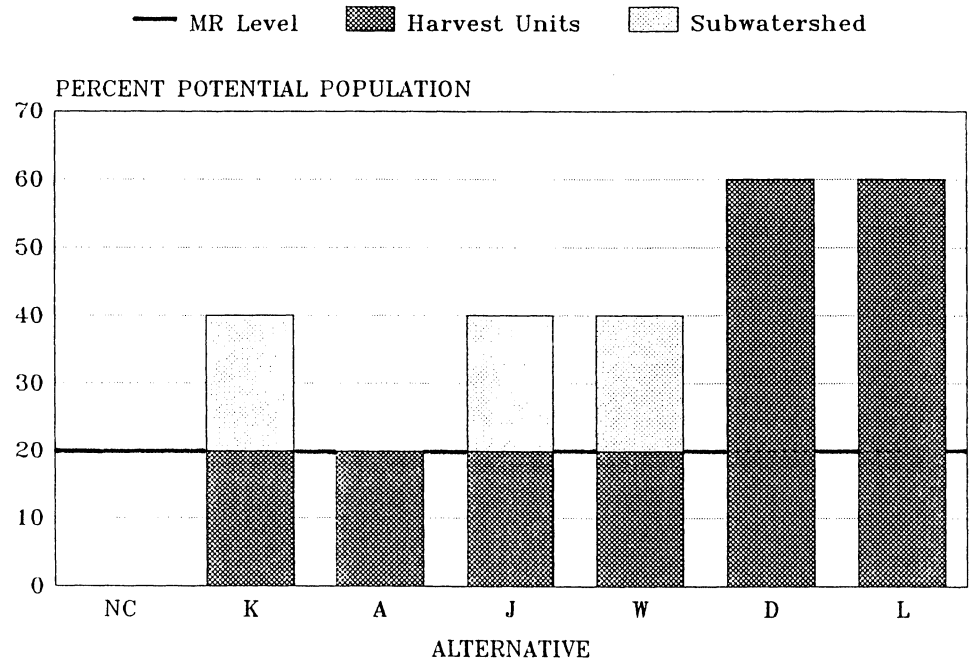


	Alternatives						
Percent Cover	**NC**	**K**	**J**	**A**	**W**	**D**	**L**
Optimal Cover	NA[1]	31	33	34	36	37	41

[1]NA = Data Not Available; could not be reasonably estimated, or compared to other alternatives, since Alternative NC (No Change) is based on a significantly different set of assumptions than the other alternatives, and could not be modeled with the current Willamette National Forest FORPLAN model. Section D4b, of Chapter II in the Draft EIS describes these differences.

Primary Cavity Excavators - All alternatives except No Change provide habitat capability to meet or exceed the Management Requirements for primary cavity excavators. Snag habitat would be maintained at or above levels required to support 40% potential populations within each subwatershed. Figure II-8 displays the percent potential populations managed for in subwatersheds and harvest units by alternative.

Figure II-8. Primary Cavity Excavator Habitat Capability[1]



	Alternatives						
% Habitat Capability	**NC**	**K**	**J**	**A**	**W**	**D**	**L**
Within Harvest Units	NA[2]	20	20	20	20	60	60
Within Subwatersheds	NA[2]	40	20	40	40	60	60
Reserved Lands	100	100	100	100	100	100	100

[1]Habitat capability is calculated for pairs of birds and is based on the needs of the red-breasted nuthatch, which has the smallest territory on the Forest.

[2]NA = Data Not Available; could not be reasonably estimated, or compared to other alternatives, since Alternative NC (No Change) is based on a significantly different set of assumptions than the other alternatives, and could not be modeled with the current Willamette National Forest FORPLAN model. Section D4b, of Chapter II in the Draft EIS describes these differences.

Old Growth

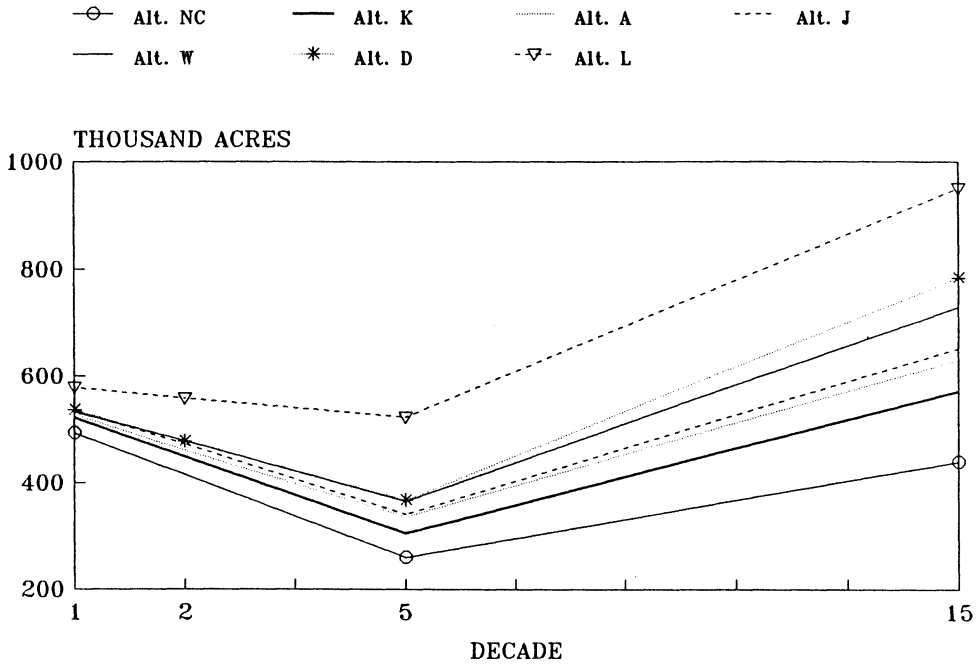
Old-growth timber is characterized by large old trees, multi-layered canopies, standing snags, and large logs in streams and on the forest floor. In the Douglas-fir region of western Oregon, old-growth forests begin to develop at between 150 and 250 years of age (Spies, 1989). Managed stands may begin to show these characteristics earlier by leaving large standing green trees and snags, and large woody debris on the ground. These stands may provide some of the needs for wildlife and plant species that are associated with old growth as early as 60 to 70 years after regeneration of the site following harvest activities. Existing young stands that are to be managed on long rotations can be commercially thinned to wider spacings in order to stimulate the development of multi-canopy stands. Alternatives J, W, D and L manage long rotation areas by leaving 10 large green trees, in addition to wildlife trees, to enhance the development of old growth habitat. All of the alternatives have the option of thinning existing young stands to a wider spacing to enhance understory development in areas of long rotations.

Fragmentation of old growth stands reduces the quality of the habitat for several reasons: 1) the edges of old growth stands are poorer quality due to increased disturbance and climatic extremes; 2) small stands are not suitable for species who require larger home ranges; and 3) animals and plants moving between widely spaced old growth habitat are subjected to higher rates of mortality. Long-term viability of populations of some species may be lower in landscapes where their habitat is highly fragmented. Minimizing fragmentation by grouping harvest units closer together is an option for maintaining the remaining large blocks of old growth habitat for a longer period of time. This option is available under all alternatives, where compatible with other resource objectives.

Because of the current concerns about global warming and increasing levels of carbon dioxide in the atmosphere, it is appropriate to discuss the role of forests in cycling and storing carbon. Carbon dioxide is one of the radiatively active gases that may be involved in the "greenhouse effect". Forests account for about 60% of the stored carbon on the earth's land surface, and old growth forests store significantly more than managed forests, even when considering repeated rotations (Harmon, et. al., 1990). The net reduction in stored carbon when converting from old growth to managed stands is about 150 tons per acre. The effects of the alternatives do not differ much and are not significant by themselves, when comparing against the regional levels of carbon storage. Long-term monitoring and research is needed to determine cumulative effects.

As a result of the Mature and Overmature Survey (MOMS), there are currently about 594,800 acres of old-growth stands that meet the Region Six definition of old growth (see Vegetation, Chapter III). Figure II-9 displays the amount of old-growth timber remaining at the end of decades 1, 2, 5, and 15+, for each alternative. For each alternative the lowest amount provided over time occurs in the fifth decade. Declines in old growth acres from decade 1 to 5 reflect the rate of timber harvest. Increases in old-growth stands after the fifth decade represent timber stands in no-harvest allocations, currently in a young or mature condition, that in the future will begin to exhibit old-growth characteristics. The figure for decade 15+ represents the potential amount of old growth for each alternative, barring catastrophic events.

Figure II-9. Old-Growth Acres Over Time



	Alternatives [1]						
	NC [2]	K	A	J	W	D	L
Decade 1 (M Ac.)	494.0	522.4	528.4	534.9	533.4	537.2	578.3
Decade 2 (M Ac.)	NA	449.7	460.9	473.6	479.1	478.4	558.1
Decade 5 (M Ac.)	259.8	305.1	337.0	341.4	365.2	367.8	523.1
Decade 15+ (M Ac)	440.1	571.7	630.2	651.1	729.9	785.1	951.4

[1]Acres of old-growth timber, in all allocations, remaining at the end of each decade. Decade 15+ values show potential old growth on forested no-harvest allocations, assuming no catastrophic events.

[2]NA = Data Not Available; could not be reasonably estimated, or compared to other alternatives, since Alternative NC (No Change) is based on a significantly different set of assumptions than the other alternatives, and could not be modeled with the current Forest FORPLAN model. Differences are described in Chapter II, Description of Alternatives.

Fish

Anadromous and resident salmonids are Management Indicator Species for stream habitat. The estimated number of anadromous smolt is dependent on the number of returning adults, and the quantity and quality of habitat.

The numbers of spawning adults will be influenced by stocking programs and fishing regulations established by Oregon Department of Fish and Wildlife (ODFW). The Forest will aid in enhancement of population levels through management of smolt incubator boxes. These, and other improvement projects are conducted in cooperation with the volunteer program, Salmon and Trout Enhancement Program (STEP).

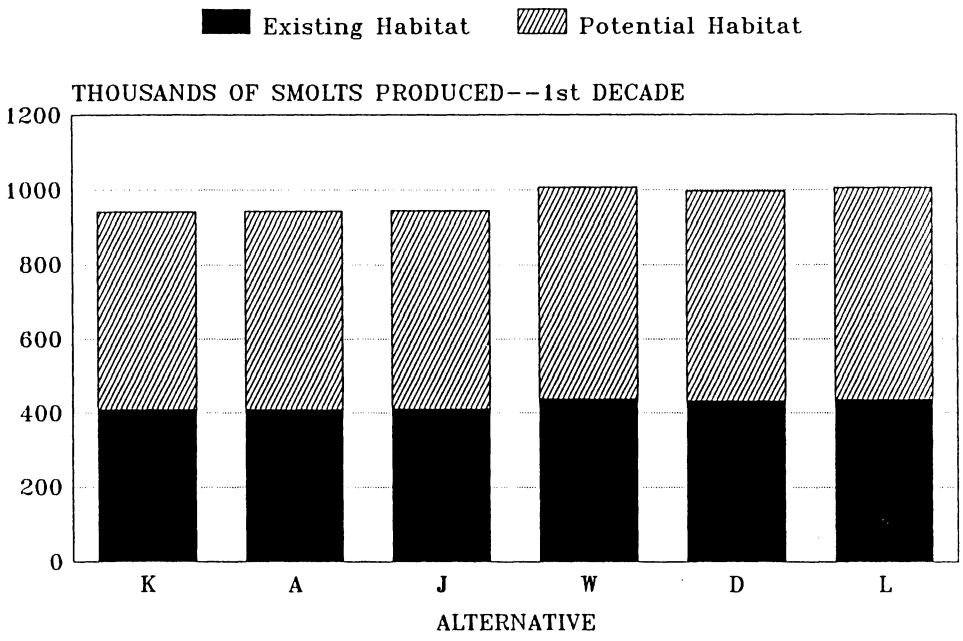
Changes to the quality of existing habitat during the next decade is influenced by habitat improvement projects, and the effects of timber sale projects. Approximately 60 miles of existing anadromous habitat, will be scheduled for habitat improvement projects in all alternatives. Increases in smolt from these projects will not become apparent for 3 generations of returning adults, thus will not be seen until the second decade.

Changes to the quantity of habitat available during the next decade will be largely dependent on the success in providing passage for spring chinook around four major reservoirs; Green Peter, Foster, Blue River, and Cougar. Minor increases in the quantity of habitat may be acheived around smaller barriers to passage on the Forest. The Forest Service will work in partnership with ODFW, Army Corps of Engineers (ACE) and other agencies to facilitate passage around these reservoirs. Habitat improvement projects would be made in approximately 30 miles of this additional habitat.

Timber sales effect the capability of streams to produce smolt in approximately the same proportion of acres harvested, with particular influence from practices which effect riparian areas, and slope stability.

Estimates of outputs are shown as Smolt Habitat Capability Index in the Figure II-10. This is intended to show relative differences between alternatives and other practices influencing smolt production.

Figure II-10. Smolt Habitat Capability Index



	Alternatives						
Smolt Produced [2]	**NC [1]**	**K**	**A**	**J**	**W**	**D**	**L**
FIRST DECADE							
Existing Habitat	NA	409	410	411	438	433	438
Potential Habitat	NA	533	533	535	569	564	569
TOTAL		942	943	946	1007	997	1007
SECOND DECADE							
Existing Habitat	NA	536	536	538	572	567	572
Potential Habitat	NA	744	744	746	794	786	794
TOTAL		1280	1280	1284	1366	1353	1366

[1]NA = Data Not Available; could not be reasonably estimated, or compared to other alternatives, since Alternative NC (No Change) is based on a significantly different set of assumptions than the other alternatives, and could not be modeled with the current Willamette National Forest FORPLAN model. Differences are described in Alternatives Considered in Detail, Chapter II.

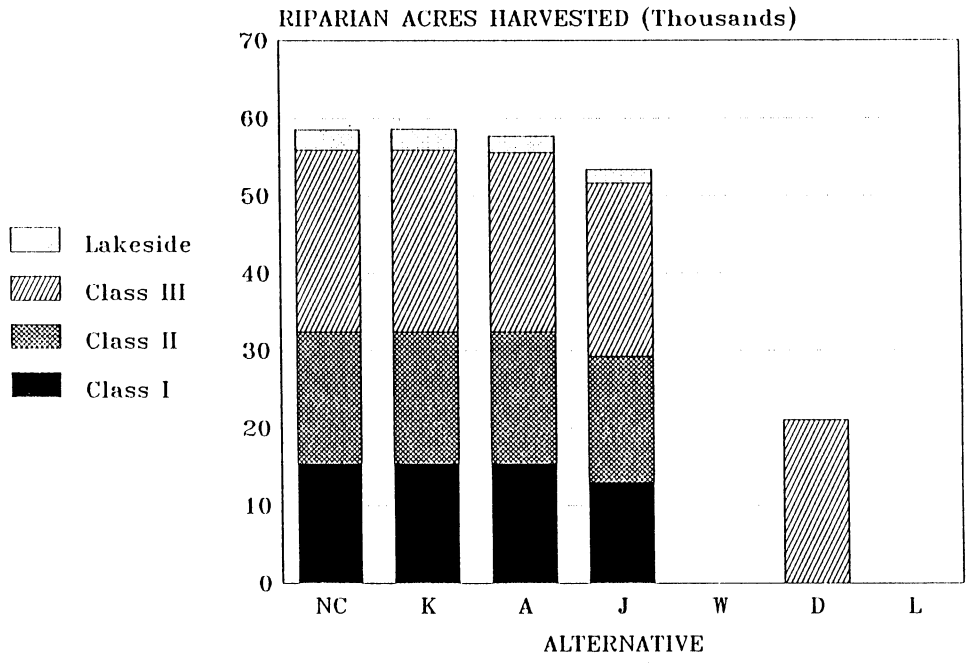
[2]Calculated with coefficients described in "Anadromous Fish Planning Coefficients" 1920 Memo, May 1, 1987. Index numbers indicate thousands of smolt.

Riparian

Timber harvest is scheduled from riparian areas in Alternatives NC, A, K, and J. In these alternatives harvest is scheduled at 5% per decade for Class I and II streams, and 7% per decade for Class III streams. Alternative D proposes no harvest on Class I, and II streams, and 5% per decade on Class III streams. Alternative W and L propose scheduling no timber harvest from areas adjacent to any of these perennial streams. Figure II-11 displays riparian acres by stream class which are scheduled for some level of timber harvest in each alternative. Where the estimated rate of harvest is lower than the rates described above, the acres are in allocations with reduced harvest rates.

Harvest rates within the riparian areas have effects on many resources. Riparian dependent resources, such as water, fish, terrestrial and amphibian species will be influenced. Management of vegetation in riparian zones has the potential to effect the availability of optimal thermal cover for big game animals, and habitat for birds which are primary cavity excavators. These areas have the potential to provide important corridors for dispersion of interior species across the landscape, and to provide quality recreation opportunities for visitors to the Forest.

Figure II-11. Comparison of Riparian Area Management



		Alternatives[1]						
Stream Class	**% Harvest Rate/ Decade**	**NC[2]**	**K**	**A**	**J**	**W**	**D**	**L**
Class I	0%	NA	4.1	4.1	6.5	19.5	19.5	19.5
	5%	NA	15.4	15.4	13.0	0	0	0
Class II	0%	NA	4.5	4.5	5.2	21.5	21.5	21.5
	5%	NA	17.0	17.0	16.3	0	0	0
Class III	0%	NA	6.1	6.5	7.3	29.7	8.6	29.7
	5%	NA	0.4	0.5	0.6	0	21.1	0
	7%	NA	23.2	22.7	21.8	0	0	0
Lakeside	0%	NA	2.0	2.2	2.6	4.5	4.5	4.5
	5%	NA	0.8	0.9	1.1	0	0	0
	7%	NA	1.2	1.0	0.4	0	0	0
	10%	NA	0.6	0.4	0.4	0	0	0

[1]Total riparian acres in management areas with scheduled harvest in thousands of acres.
[2]NA = Data Not Available; could not be reasonably estimated, or compared to other alternatives, since Alternative NC (No Change) is based on a significantly different set of assumptions than the other alternatives, and could not be modeled with the current Forest FORPLAN model. Differences are described in Chapter II, Description of Alternatives.

Roadless Lands

Roadless lands are defined as inventoried areas of undeveloped Federal land within which there are no improved roads maintained for travel by motorized vehicles intended for highway use. The roadless area inventory does not include areas designated by Congress (Wilderness, the Oregon Cascades Recreation Area which comprise 23% of the Forest), or other areas of less than 5,000 acres.

In the Forest, current roadless lands in parcels larger than 5,000 acres or adjacent to Wilderness, comprise 172,007 acres in 31 inventoried areas. The alternatives vary in the amount of roadless land they maintain in an undeveloped condition. Each alternative proposes management of these lands for uses that range between full commodity production and recommended Wilderness. Table II-11 displays the percent of each roadless area to remain in an undeveloped condition in each alternative.

Table II-11. Percent of Roadless Land Retained in an Undeveloped Condition

	Alternatives							
Roadless Area	Acres	NC	K	A	J	W	D	L
Bull of the Woods	6,375	65	76	75	95	94	94	56
Opal Creek	10,687	3	10	11	10	16	44	78
Elkhorn	8,958	0	15	15	15	20	99	39
Mt. Jefferson North	6,036	1	15	11	15	18	75	78
Mt. Jefferson South	4,991	1	36	28	33	34	80	98
Middle Santiam	6,783	0	3	3	3	7	59	91
Echo Mountain	7,551	68	7	70	84	81	98	99
Moose Lake	4,778	0	25	25	25	28	27	69
Menagerie (Rooster Rock)	405	0	0	0	0	5	0	16
Gordon Meadows	8,361	0	5	2	32	44	96	94
Mt. Washington North	1,003	2	15	2	21	21	100	96
Mt. Washington West	6,676	1	2	3	12	15	97	49
Mt. Washington South	4,224	3	6	3	89	90	100	100
Huckleberry	853	100	93	100	100	100	100	100
Frog Camp	469	100	0	0	100	100	100	100
Gold Creek	1,045	2	16	16	29	33	78	98
Rainbow Falls	43	0	0	0	0	0	0	0
Mosquito Creek	406	5	0	5	0	11	0	74
French Pete [1]	2,581	1	9	13	72	79	98	36
Roaring River	2,048	0	0	0	10	9	9	82
Mt. Hagan	6,292	12	21	33	39	42	99	75
McLennen Mountain	7,807	8	21	21	21	23	49	83
Chucksney Mountain	15,507	59	9	66	68	70	83	89
Waldo Lake [1]	31,889	31	6	35	50	72	88	96
Cornpatch	6,762	0	22	22	22	46	26	90
Charlton Butte	2,880	100	41	100	100	100	100	100
Maiden Peak	11,070	100	8	100	100	100	100	100
Hardesty Mountain	3,690	1	27	27	66	71	83	99
Bulldog Rock	555	50	27	50	100	100	100	100
Diamond Peak North	1,130	2	19	17	40	58	81	96
Diamond Peak South	149	0	0	0	0	100	100	71
Total All Areas-Acres and %	172,007	26	15	35	46	53	80	85

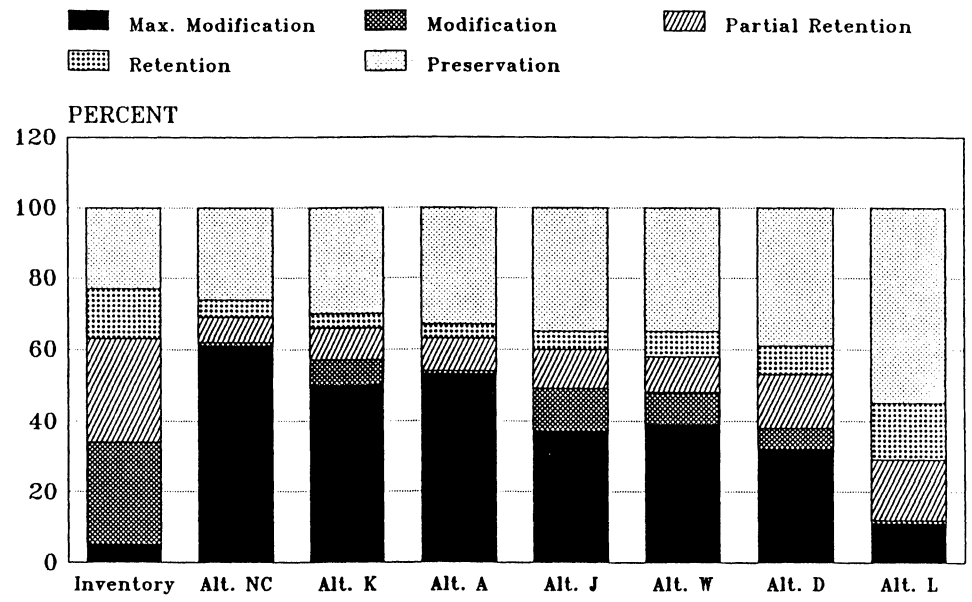
[1]This area is divided into several parts for purposes of description in Appendix C.

Scenery

The alternatives have varying effects on scenic quality as a result of the type and distribution of the proposed management areas and their associated activities. In general, alternatives emphasizing timber harvest and supporting road construction provide less Forest area managed for high levels of scenic quality.

Figure II-12 provides a Forest-wide comparison of alternatives and their effect on scenery as measured against inventoried Visual Quality Objectives (VQOs). There will be an increase in the amount of area managed for preservation as a consequence of implementing any of the proposed alternatives. However, lands to be managed for retention, partial retention, and modification VQOs will decrease from inventory levels in all alternatives, except in Alternative L where management of lands for retention will exceed inventory levels by 2%.

Table II-12. Forest-wide Effects on Inventoried Visual Quality Objectives



Visual Resource Inventory			Alternatives [1]						
Objectives	Acres	Percent	NC	K	A	J	W	D	L
Preservation	389,486	23	26	30	33	35	35	39	55
Retention	232,262	14	5	4	4	5	7	8	16
Partial Retention	488,649	29	7	9	9	11	10	15	17
Modification	484,170	29	1	7	1	12	9	6	1
Maximum Modification	80,841	5	61	50	53	37	39	32	11
TOTAL	1,675,408	100	100	100	100	100	100	100	100

[1]Expressed as percent of Inventoried Visual Quality Objective acres.

Recreation

The design of each Alternative, through the use of management areas, determines the number and type of recreational settings to be provided as well as the magnitude and nature of its recreation program. Each Alternative establishes the availability and distribution of recreation settings, miles of trail, and use levels of both developed and dispersed recreation opportunities, and thus determines the capability of the Forest to meet present and future demand for a wide range of recreation experiences. The capacity of recreational settings to sustain projected levels of demand is measured in capacity and anticipated demand for each Alternative, and Table II-12 shows the amount of each recreation opportunity setting to be provided by Alternative.

Figure II-13. Total Dispersed Recreation Use

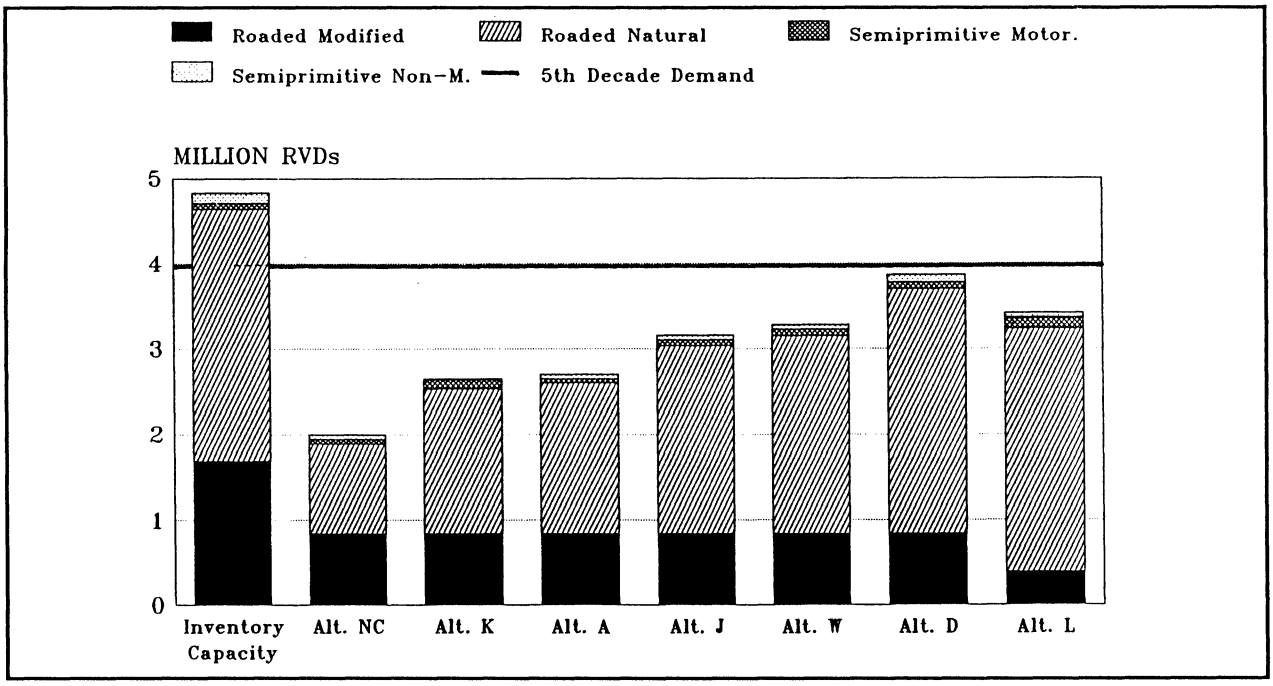


Table II-12 Recreation Opportunity Settings Provided

		Alternatives						
Opportunity Setting	**Unit**	**NC**	**K**	**A**	**J**	**W**	**D**	**L**
Dispersed Recreation	M Acres							
Semiprimitive Nonmotorized		75.3	14.4	72.2	89.5	85.8	176.5	102.0
Semiprimitive Motorized		23.9	48.3	23.4	31.3	36.0	38.2	66.3
Roaded Natural		160.8	279.7	299.1	353.0	379.0	439.9	739.6
Roaded Modified		1,034.7	952.2	900.0	820.8	793.8	637.0	215.1
Developed Recreation Sites	Sites							
Existing Retained		204	204	204	204	204	204	204
Proposed New		0	54	0	15	31	18	0
NonWilderness Trails	Miles							
Existing Retained		714	714	714	714	714	714	714
Proposed New		0	0	0	40	60	68	40

Wild and Scenic Rivers

All of the alternatives provide for protection and management of free-flowing conditions and "outstandingly remarkable values" of designated Wild and Scenic Rivers and designated Study Rivers in accord with the Wild and Scenic Rivers Act. Also, all of the alternatives, except the No Change Alternative, provide interim protection for all rivers determined eligible for inclusion into the National Wild and Scenic Rivers System. Interim protection of free-flowing conditions and "outstandingly remarkable values" of designated Study Rivers and all eligible river segments is provided at the highest river classification for which they qualify. Interim protection of both designated Study Rivers and eligible river segments is maintained until a river segment is determined unsuitable for inclusion into the National System. The management status, river mileage, and corridor acreage of Forest rivers for each alternative is displayed in Table II-13.

Table II-13. Wild and Scenic River Protection Status

		Alternatives						
River Designation[1]	**Units**	**NC**	**K**	**A**	**J**	**W**	**D**	**L**
Wild and Scenic Rivers	Rivers	2	2	2	2	2	2	2
	Miles	55.0	55.0	55.0	55.0	55.0	55.0	55.0
	Acres	17,459	17,459	17,459	17,459	17,459	17,459	17,459
W & S Study Rivers	Rivers	2	2	2	2	2	2	2
	Miles	34.2	34.2	34.2	34.2	34.2	34.2	34.2
	Acres	10,944	10,944	10,944	10,944	10,944	10,944	10,944
Eligible for W & S Status	Rivers	0	8	8	8	8	8	8
	Miles	0	122.2	122.2	122.2	122.2	122.2	122.2
	Acres	0	41,927	41,927	41,927	41,927	41,927	41,927
TOTALS	Rivers	4	12	12	12	12	12	12
	Miles	89.2	211.4	211.4	211.4	211.4	211.4	211.4
	Acres	28,403	70,330	70,330	70,330	70,330	70,330	70,330

[1] The Little North Santiam River, McKenzie River, South Fork of the McKenzie River, and the North Fork of the Middle Fork of the Willamette River are also designated as State Scenic Waterways.

Wilderness

The Wilderness Act of 1964 states that Wilderness is to be managed in such a manner "devoted to the public purpose of recreational, scenic, scientific, educational, conservation and historical use" only to the extent that the essential Wilderness character of the area is protected. However the accommodation of any use of Wilderness is likely to result in some effect on it's resources or character. A Wilderness management system known as the Wilderness Resource Spectrum (WRS) is the primary method used to assure objectives of the Wilderness Act are realized. The WRS is divided into four management classes that are applied to areas within Wilderness based on such factors as use density, resource conditions, user experiences, and location of camping sites and trails. The alternatives vary widely in how they propose to accommodate human use and protect essential Wilderness character as required by the Act. Each alternative responds differently to this requirement, primarily, through the amount and distribution of WRS Classes and application of their respective standards and guidelines for management of human use and resource conditions. The amount of each WRS Class and projected visitor use, by class, for each alternative is displayed in Table II-14.

Table II-14. Wilderness Resource Spectrum Acres and Visitor Days

		Alternatives 1						
WRS Class	**Units**	**NC[2]**	**K**	**A**	**J**	**W**	**D**	**L**
Pristine	Acres	--	299.3	299.3	299.3	299.7	299.3	411.2
	RVDs	--	16.7	16.7	16.7	16.7	16.7	16.7
Primitive	Acres	--	41.0	41.0	41.4	44.0	67.0	54.9
	RVDs	--	131.0	131.0	131.0	123.4	131.0	131.0
Semiprimitive	Acres	--	26.0	26.0	36.8	35.0	14.5	81.8
	RVDs	--	138.4	138.4	195.7	155.9	59.5	199.8
Transition	Acres	--	14.5	14.5	3.3	2.1	0.0	2.3
	RVDs	--	66.0	66.0	24.6	22.1	0.0	23.0
TOTALS	Acres	380.8	380.8	380.8	380.8	380.8	380.8	550.2
	RVDs	330.7	352.1	352.1	368.0	318.1	207.2	370.5

[1] Recreation Visitor Days are 1st decade outputs only.
[2] Wilderness Resource Spectrum Classes are not applicable to the No Change Alternative.

Special Areas

The Forest includes many areas that exhibit unique ecological, biological and geological characteristics as well as other areas that offer opportunities for a wide range of recreation activities within a semiprimitive setting. These lands are inventoried to identify their recreational, scientific, scenic, geological, botanic, historical, and cultural values and where appropriate are designated to protect their special features and qualities and to foster public use, enjoyment and study. The alternatives vary in the type and number of areas they propose to protect and maintain in an essentially undeveloped condition as well as in the amount of area they dedicate to these special areas. Areas inventoried as having potential or value as Special Interest Areas, Old Growth Groves, or Semiprimitive Recreation Areas but are not specifically designated as such are allocated to other uses that could, depending on the alternative, alter their suitability for special designation. The number and acreage of Special Interest Areas, Old Growth Groves, and Semiprimitive Dispersed Recreation Areas that are included in each alternative are displayed in Table II-15.

Table II-15. Special Recreation Areas

		Alternatives						
Type of Area	**Units[1]**	**NC**	**K**	**A**	**J**	**W**	**D**	**L**
Special Interest Areas	Areas	4	9	4	27	46	29	7
	M Acres	1.1	2.8	1.1	22.6	31.1	15.2	3.4
Old Growth Groves	Areas	22	7	22	18	34	18	24
	M Acres	2.8	0.9	2.8	5.0	6.7	3.1	3.1
Semiprimitive Rec. Areas [2]	Areas	18	11	18	20	24	40	22
	M Acres	94.9	52.9	94.9	104.5	104	110.0	166.1
TOTALS	Areas	44	27	44	65	101	87	53
	M Acres	98.8	56.6	98.8	132.1	143.2	128.3	172.6

[1] Acreages are in thousands of acres. Variation in acres from those reported inManagement Area Acreage of Alternatves are due to overlap with Special Habitat Management Areas.
[2] Includes the Oregon Cascades Recreation Area (6,058 ac.).

Research Natural Areas

The alternatives vary in their response to research needs through the designation of new Research Natural Areas. In some of the alternatives potential research opportunities would be foregone through development of some areas for resource utilization, and some areas would be subject to the influences and potential effects of adjacent management activities. The effects on potential RNAs allocated to uses other than research is based on whether or not the selected allocation or use would result in development of area resources or that specific uses would affect baseline conditions of an otherwise undisturbed environment. The degree of development effects on RNAs in each alternative is displayed by development category in Table II-16.

Table II-16. Effects on Research Natural Areas[1]

	Alternatives[2]						
Development Categories	**NC**	**K**	**A**	**J**	**W**	**D**	**L**
No Development	79	69	79	94	100	96	94
Limited Development	7	1	7	2	0	0	1
Full Development	14	30	14	4	0	4	5
TOTAL	100	100	100	100	100	100	100

[1]Includes Middle Santiam RNA within the Middle Santiam Wilderness, the western portion of the Torrey-Charlton RNA within Waldo Lake Wilderness, and a portion of the McKenzie Pass RNA within the Three Sisters Wilderness.
[2]Values are in percent of total acres of potential and established RNAs.

Soil and Water

The potential effects of the proposed activities on soil are highest in those alternatives with the highest timber harvest and road construction levels.

Proposed activities are expected to maintain soil conditions so that less than 20% of an area is not in detrimental soil conditions, such as compacted, displaced or eroded. Soil rehabiliation projects will be implemented where needed to reduce compaction, and establish soil cover.

The risk of loss of soil productivity due to erosion or displacement of the soil profile will be highest where trees are yarded with ground-based equipment, and where fuel treatments include broadcast burning. The extent to which these practices occur is determined during project design. The potential acres to be broadcast burned varies by alternative, but is directly related to acres clearcut. The effects of each burn are largely dependent on the climatic conditions at the time of burn. The potential production of sediment is closely correlated to the acres of regeneration timber harvest. Table II-17 displays these acres by Alternative.

Table II-17. Primary Activities Affecting Soils

Activity	Units	NC [1]	K	A	J	W	D	L
Road Construction	Miles							
	Decade 1	NA	550	500	450	400	300	120
	Decade 2	NA	90	130	70	70	50	40
	Decade 5	NA	40	50	40	20	10	10
Final Harvests [2]	M Acres							
	Decade 1	144	121	125	102	91	99	33
	Decade 2	NA	121	126	100	92	100	27
	Decade 5	NA	116	118	82	81	85	23

[1]FORPLAN was not used with this Alternative. NA means the information is not available. Road construction miles are estimated to be similar to Alternative B-Departure.
[2]Final harvests include clearcuts and shelterwoods only.

The quantity and timing of water flow is expected to vary only slightly between alternatives.

The quality of water, and the stability of the stream channels is described in terms of risk of adverse cumulative effects to these resources. Alternatives J, W, D, and L increase the risk of adverse changes to water quality and of stream channel condition when compared with a continuation of current direction (Alternative A), Alternative K or the NC alternative. All alternatives increase the risk of adverse cumulative changes to water quality and stream channel conditions when compared with the average natural conditions. The relative differences in risk between alternatives is shown in the Table II-18.

Table II-18. Cumulative Watershed Effects Summary

	Alternatives[1]						
Risk Category [2]	**NC [3]**	**K**	**A**	**J**	**W**	**D**	**L**
High Risk	NA	29	28	18	0	12	0
Moderate Risk	NA	27	25	17	0	10	0
Low Risk	NA	44	47	65	100	78	100

[1]Values presented are the percent of the Forest in each category in the 1st decade.
[2]See Chapter IV and Appendix B for description of risk.
[3]Data is not available. Alternative NC would be expected to produce greater effects than Alternative B-Departure (DEIS).

Mineral Resources

Regulation of mineral and energy related activities on National Forest System lands is shared with the Bureau of Land Management (BLM). Regulation of mineral and energy exploration and development are indirectly influenced by the proposed land use allocations and their associated management prescriptions. Factors that determine the degree of mineral exploration and development that may occur are the availability of access, the objectives for each management area, the demand for minerals, and geologic potential. Access and management area objectives are the factors that vary by alternative.

The Forest will recommend to the BLM that land allocations that place a high emphasis on the protection of resources such as visual quality, recreation, wildlife habitat, and special or unique areas, be withdrawn from mineral entry. In other cases, restrictions such as use periods, surface protection measures, and rehabilitation requirements may be required. Access for exploration may also be limited because of the lack of existing roads and other resource developments.

Management prescriptions affect the availability of the land for mineral exploration and development. All Forest lands are in one of three levels of availability; open, restricted or withdrawn.

Open lands for locatable minerals and energy development or leasing are in areas where management designations do not require special mitigative measures, although restrictive lease stipulations or operating plan conditions may be required to mitigate for situations such as unstable soils or visual sensitivity. In general, standard field practices for mining and mineral lease activities can be used.

Restricted lands are available for locatable minerals and energy development or leasing with specific requirements that significantly affect access and ground disturbing activities. This includes management areas where resource considerations require special mitigative measures.

Withdrawn lands are unavailable for locatable minerals and energy development and/or leasing because of other resource values or investments. The Bureau of Land Management reviews all agency withdrawal recommendations and makes recommendations to the Secretary of Interior.

Table II-19 shows the effect of the alternatives on accessibility for exploration and development of locatable minerals. The mineral resource program on the Forest is compared among the alternatives by determining the acres available for mineral exploration and development activities and in terms of regulatory constraints.

Table II-19. Acres Withdrawn, Restricted or Open For Minerals

	Alternatives						
Availability of Minerals	**NC**	**K**	**A**	**J**	**W**	**D**	**L**
Withdrawn							
Nondiscrectionary[1]	402,252	402,252	402,252	402,252	402,252	402,252	571,602
Discrectionary	29,789	149,951	137,131	168,807	190,796	209,300	329,249
Restricted	92,273	50,637	89,116	104,389	154,066	258,592	208,183
Open	1,097,110	1,072,580	1,046,921	999,972	928,306	805,276	566,376

[1] Includes existing and proposed Wilderness, H.J. Andrews Experimental Forest and the Oregon Cascades NRA.

The Alternatives propose varying levels of lands open to minerals developments ranging from 43% of the Forest landbase in Alternative L to 65% in Alternative NC.

About 44,600 acres on the Forest have moderate potential for locatable minerals with the remaining 1,630,800 acres having low or unknown potential. Of the acres with moderate potential, 8,319 are legislatively or administratively withdrawn.

Approximately 18,344 acres on the Forest have moderate potential for geothermal resources, 178,550 acres have low potential and 1,478,510 acres with no know potential. Of this, about 491 acres are legislatively or administratively withdrawn.

The USDI Bureau of Land Management has not classified the Forest as to its prospective value as an oil and gas producer. Currently there area about 20,700 acres in leases for oil and gas. The alternatives affect oil and gas exploration and development much in the same way as locatable minerals are affected.

The Forest Service has total management responsibility for the disposal of salable minerals which include minerals such as sand, stone, gravel, cinders, pumice, pumicite, and clay.These minerals are extracted from surface and subsurface layers and are used mostly for road construction and maintenance. Restrictions on this category are similiar to those described for locatable minerals.

Energy

Table II-20 shows the estimated net energy balance for each Alternative. The table shows the difference between the estimated energy requirements and the energy outputs for each Alternative. The values in the table are all negative which indicates that implementation of any Alternative would consume more energy than it would produce. Existing and potential hydropower as well as potential geothermal energy production were not included in the estimates. These production levels would be constant across all Alternatives. Examples of items which were used to calculate energy input are:

- Timber - Logging, construction and reconstruction of roads, transport to mill, processing.
- Fuels - Fuel treatment
- Recreation - Developed recreation construction, operation and maintenance, and recreational travel.

In general, alternatives with higher levels of timber harvest would have higher levels of energy consumption. Increased emphasis on developed recreation and motorized dispersed would also tend to increase total energy consumption, however, this varies less among the alternatives than the energy consumed in timber harvesting and related activities.

Table II-20. Average Annual Net Energy Balance

	Alternatives						
Decade	NC	K	A	J	W	D	L
1st	-13,300	-13,517	-13,300	-12,375	-10,774	-8,523	-7,261
2nd	-13,255	-13,681	-13,255	-12,469	-11,007	-9,344	-7,933
5th	-10,610	10,894	-10,610	-10,219	-8,549	-7,594	-6,411

Roads

The road transportation network currently consists of 6600 miles of road. Most present and future transportation needs are accomodated with the current system.

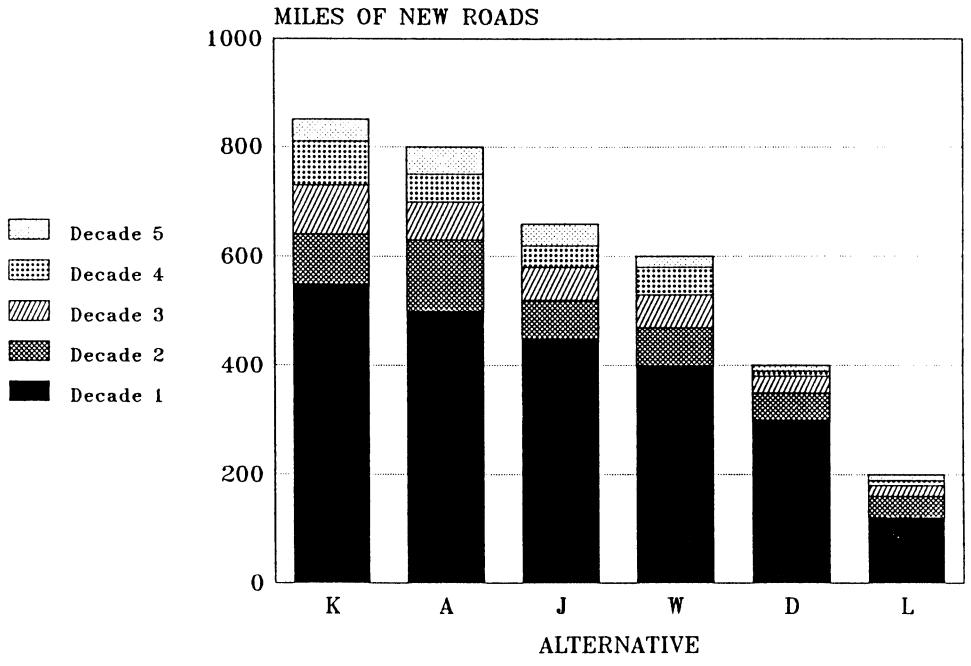
Additional access would be needed during the planning period to accomplish timber, recreation, and administrative objectives in all alternatives. The miles of new road construction would vary by alternative in direct proportion to the level of timber harvest.

The Forest road system would be at least 97% complete for all alternatives by the end of the second decade. Beyond that, additional access needs will diminish.

Roads would be reconstructed, maintained, and managed to meet objectives for recreation, water quality, wildlife management, and other resources. Roads which are no longer needed for present or future access would be permanently closed, stabilized, and revegetated.

Figure II-14 shows the new road construction for each Alternative. The amount of miles in each of these categories is directly proportional to the amount of timber scheduled for harvest.

Figure II-14. Road Construction by Alternative



			Alternatives						
Output	**Unit**	**Decade**	**NC [1]**	**K**	**A**	**J**	**W**	**D**	**L**
Road Construction	Miles	1	NA	550	500	450	400	300	120
		2	NA	90	130	70	70	50	40
		3	NA	90	70	60	60	30	20
		4	NA	90	70	60	60	30	20
		5	NA	40	50	40	20	10	10
Total			NA	850	800	700	600	400	200

[1]NA = Data Not Available; could not be reasonably estimated, or compared to other Alternatives, since Alternative NC (No Change) is based on a significantly different set of assumptions than the other Alternatives, and could not be modeled with the current Willamette National Forest FORPLAN model.

Residue Treatment

All alternatives would require the treatment of some woody residues following timber harvest. Fire would be used as the primary management tool in all alternatives to reduce levels of residues from timber harvest to meet resource objectives. Such objectives would be the reduction of wildfire hazard, increasing the success of reforestation activities, and occasionally to create conditions favorable to the establishment of wildlife forage. The primary method of treatment would be broadcast burning, although underburning and pile burning would also be used.

The number of acres burned would be dependent on the number of acres with timber harvest (See Timber section), the type of timber harvested, and other resource objectives. Where old-growth timber is harvested, approximately 80% of the acres would require some residue reduction. Harvest of second-growth stands results in less residues, and approximately 50% of these harvest areas would be treated.

The number of acres treated annually would also be dependent on timing restrictions needed to meet objectives for air quality, soil, and water resources. Currently, to meet air quality regulations, no burning in done between July 4 and Labor Day. Prescriptions for protecting soil and water resources require that areas would be treated with "cool" burns, thus limiting the number of days suited to burning to those when particular climatic conditions occur. The number of acres burned would also be dependent on the amount of time when fuels are dry enough, and be influenced by precipitation patterns.

In those alternatives with fewer harvest acres, fewer acres would be treated with fire.

Resource Outputs, Environmental Effects, Activities And Costs

The quantitative resource outputs, environmental effects, activities, and costs associated with each Alternative are presented in Table II-22. These results have been grouped by resources. For most resources the acres allocated the activities scheduled, and the outputs or effects are reported. Costs and other economic estimates appear at the end of the table. The alternatives are ordered across the top of these Tables in the sequence of decreasing acres suitable for timber management. Unless otherwise noted, output and effect figures represent total results: direct, indirect, induced, and cumulative. All numbers represent average annual totals for the indicated decade.

The qualitative effects of the Alternatives are presented in Table II-21. Please note that the entries in Table II-21 are brief, simplistic summaries of qualitative effects that are generally quite complex. Reference to the detailed discussions in Chapter IV is needed to gain full understanding of these effects.

Many of the outputs and effects displayed in these Tables are derived from the analysis described in Appendix B. Detailed coverage of many of the results of this analysis can be found in Chapter IV. Consult these sections for further information regarding analytical procedures, results, and interpretations.

Table II-21. Resource Outputs, Effects, Activities, and Costs

Output/Effects	Unit	Decade	Alternatives						
			NC [1] (No Change)	K (WFC)	A (No Action)	J (DEIS-PA)	W (PA)	D (Wildlife)	L (ONRC)
Water									
Low Watershed Impact	% Area	1	NA	44	47	65	100	78	100
Moderate Watershed Impact		1	NA	27	25	17	0	10	0
High Watershed Impact		1	NA	29	28	18	0	12	0
Erosion (Debris Slides)	M Cu-Yd	1	NA	85.6	80.3	67.0	34.0	33.4	23.9
Water Yield	M Ac-Ft	1	8,895	8,895	8,895	8,895	8,895	8,895	8,895
		2	8,895	8,895	8,895	8,895	8,895	8,895	8,895
		5	8,895	8,895	8,895	8,895	8,895	8,895	8,895
Lands Tentatively Suitable for Timber Production	M Acres	-	1,136.4	1,032.1	1,032.1	1,032.1	1,032.1	1,032.1	1,032.1
Lands Suitable for Timber Production	M Acres	-	1,064.6	932.8	874.3	853.4	774.6	719.4	553.1
Lands by Timber Yield Levels									
Full Yield (95-100%)	M Acres	-	918.7	797.0	743.4	719.6	689.2	638.9	314.3
75-94% of Full Yield	M Acres	-	54.0	70.3	71.3	72.6	42.9	40.4	74.9
50-74% of Full Yield	M Acres	-	91.9	65.5	59.6	61.2	42.5	40.1	89.0
1-49% of Full Yield	M Acres	-	0	0	0	0	0	0	74.9
Tentatively Scheduled Timber Harvest									
Clearcut [2]	M Acres	1	14.4	12.6	12.1	10.2	9.1	9.9	3.3
		2	NA	12.6	12.1	10.0	9.4	10.0	2.8
		5	NA	11.8	11.6	8.2	8.1	8.5	2.3
Commercial Thin	M Acres	1	4.2	3.1	3.2	2.6	2.8	2.7	0.2
		2	NA	0.2	0.2	1.7	2.1	0.3	0.9
		5	NA	2.8	1.3	10.1	6.8	5.5	4.9
Reforestation	M Acres	1	14.4	12.6	12.1	10.2	9.1	9.9	3.3
		2	NA	12.6	12.1	10.0	9.4	10.0	2.8
		5	NA	11.8	11.6	8.2	8.1	8.5	2.3
Timber Stand Improvement [3]	M Acres	1	12.9	21.3	20.7	20.4	18.1	19.3	8.1
		2	NA	22.8	22.8	18.3	17.7	18.0	5.8
		5	NA	21.7	21.7	16.7	17.8	15.5	5.4
Timber Sale Program Quantity [4]	MMBF	1	1,013	799	748	652	604	586	185
		2	NA	810	760	654	596	597	190
		5	NA	621	555	558	495	438	142

Output/Effects	Unit	Decade	NC [1] (No Change)	K (WFC)	A (No Action)	J (DEIS-PA)	W (PA)	D (Wildlife)	L (ONRC)
Timber Sale Program Quantity [4]	MMCF	1	183	144	135	116	107	105	33
		2	NA	144	135	116	107	106	33
		5	NA	127	117	110	98	92	30
Allowable Sale Quantity [5]	MMBF	1	810	650	608	530	491	476	150
		2	810	658	618	532	484	486	155
		5	810	573	532	481	440	407	129
Allowable Sale Quantity [5]	MMCF	1	146	117	110	95	87	86	27
		2	146	117	110	95	87	86	27
		5	146	117	110	95	87	86	27
Long-Term Sustained Yield	MMCF	-	146.0	120.0	113.5	107.8	94.7	93.8	34.2
Firewood [6]	M Cords	1	71.9	57.0	53.6	46.2	42.4	41.8	13.5
		2	NA	57.0	53.6	46.2	42.4	41.9	13.5
		5	NA	24.2	19.2	33.8	25.0	16.4	6.8
Timber Growth in 5th Decade	MMCF	-	NA	112.1	105.9	102.8	88.9	91.0	33.9
Old Growth at End of Decade[7]	M Acres	1	494.0	522.4	528.4	534.9	533.4	537.2	578.3
		2	NA	449.7	460.9	473.6	479.1	478.4	558.1
		5	259.8	305.1	337.0	341.1	365.2	367.8	523.1
Fuel Treatment	M Acre	1	8.6	7.6	7.3	6.1	5.5	5.9	2.0
		2	NA	7.6	7.3	6.0	5.6	6.0	1.7
		3	NA	7.1	7.0	4.9	4.9	5.1	1.4
Anadromous Smolt Habitat Capability	M Smolt	1	NA	409	410	411	438	433	437
		2	NA	536	536	538	572	567	572
		5	NA	536	536	538	572	567	572
Resident Fish Production Capability	M Legal Size	1	NA	2427	2427	2427	2506	2506	2506
Bald Eagle	Protected Sites[8]	-	21	21	21	24	24	27	27
Spotted Owl Habitat Areas	Areas	-	NA	59	59	59	59	102	184
Pileated Woodpeckers	Areas [9]	-	NA	156	156	156	156	274	355
Marten	Areas [9]	-	NA	256	256	256	256	412	438

Output/Effects	Unit	Decade	NC [1] (No Change)	K (WFC)	A (No Action)	J (DEIS-PA)	W (PA)	D (Wildlife)	L (ONRC)
Primary Cavity Excavators	% Bio. Poten- tial	1	NA	40	38	41	43	44	49
		2	NA	43	43	43	45	46	49
		5	NA	40	41	42	45	45	49
Elk	PTI [10]	1	NA	1.0	1.1	1.2	1.3	1.5	1.5
		2	NA	0.97	1.2	1.3	1.6	2.0	1.9
		5	NA	0.91	1.2	1.2	1.5	2.4	1.9
Deer	PTI [10]	1	NA	1.0	1.1	1.3	1.4	1.6	1.5
		2	NA	0.98	1.2	1.6	1.7	2.1	2.0
		5	NA	0.96	1.2	1.3	1.6	2.5	2.0
Consumptive Wildlife Use	MWFUDs	1	NA	108	117	129	145	157	157
		2	NA	104	125	145	177	217	206
		5	NA	99	125	129	168	263	206
Nonconsumptive Wildlife Use	MWFUDs	1	NA	704	758	841	941	1021	1021
		2	NA	674	811	941	1153	1338	1409
		5	NA	644	811	841	1049	1338	1708
Acres of Unroaded Areas Still Meeting Roadless Definitions at the End of the Decade.	M Acres	1	84.9	104.9	70.8	42.0	52.7	0.8	16.3
		2	45.7	65.7	22.7	23.2	30.6	0.0	12.9
		5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Unroaded Areas Assigned to Unroaded Rx	M Acres	-	45.4	25.3	59.8	79.7	92.1	136.9	145.9
Visual Quality Objectives									
Preservation	M Acres	-	437.9	503.8	547.4	586.4	591.1	647.7	912.8
Retention	M Acres	-	88.6	72.0	77.9	90.5	118.8	142.1	265.1
Partial Retention	M Acres	-	114.3	147.5	150.1	177.7	171.7	245.7	286.3
Modification	M Acres	-	4.5	123.6	4.5	206.2	143.0	108.4	4.5
Maximum Modification	M Acres	-	1,030.1	828.6	895.4	614.6	650.8	531.6	210.6
Trail Construction	Miles	1	0	0	0	4.0	6.0	6.8	4.0
		2	0	0	0	0	0	0	0
		5	0	0	0	0	0	0	0
Trail Reconstruction	Miles	1	68	68	68	70	72	72	70
		2	68	68	68	70	72	72	70
		5	68	68	68	70	72	72	70
Developed Site Construction	PAOT	1	0	390	0	51	327	120	0
		2	0	390	0	20	56	55	0
		5	0	390	0	0	25	0	0

Output/Effects	Unit	Decade	NC [1] (No Change)	K (WFC)	A (No Action)	J (DEIS-PA)	W (PA)	D (Wildlife)	L (ONRC)
Developed Site Reconstruction	PAOT	1	844	844	844	844	844	844	844
		2	844	974	844	861	953	884	844
		5	844	1040	844	868	1014	902	844
Developed Recreation Use [11]	MRVDs	1	2,056	2,056	2,056	2,056	2,056	2,056	2,056
		2	2,539	2,953	2,539	2,799	2,953	2,830	2,539
		5	2,539	4,481	5,539	2,799	3,073	2,830	2,539
Wilderness Recreation Use [11]	MRVDs	1	352	352	352	368	342	207	370
		2	415	415	415	401	342	269	447
		5	436	436	436	412	342	283	460
Nonwilderness Dispersed Recreation Use[11 12]									
Semiprimitive Nonmotorized Use	MRVDs	1	52	7	50	54	52	70	52
		2	52	7	50	54	52	90	52
		5	52	7	50	54	52	90	52
Semiprimitive Motorized Use	MRVDs	1	50	64	49	64	64	64	64
		2	50	93	49	69	76	80	93
		5	50	111	49	69	76	80	126
Roaded Natural Use	MRVDs	1	1,054	1,278	1,278	1,278	1,278	1,278	1,278
		2	1,054	1,694	1,764	1,880	1,880	1,880	1,880
		5	1,054	1,694	1,764	2,194	2,310	2,853	2,853
Roaded Modified Use	MRVDs	1	376	376	376	376	376	376	376
		2	553	553	553	553	553	553	382
		5	839	839	839	839	839	839	382
Road Construction	Miles	1	82	55	50	45	40	30	12
		2	36	9	13	7	7	5	4
		5	0	4	5	4	2	1	1
Road Reconstruction	Miles	1	236	222	204	178	174	153	81
		2	NA	220	202	176	171	151	79
		5	NA	220	202	176	171	151	79
Roads Suitable For Public Use									
Passenger Car	Miles	1	1,735	1,580	1,610	1,600	1,580	1,580	1,580
		2	NA	1,585	1,660	1,640	1,585	1,585	1,585
		5	NA	1,585	1,670	1,650	1,585	1,585	1,585
High Clearance Vehicles Only	Miles	1	4,600	4,600	4,560	4,530	4,530	4,500	4,200
		2	NA	4,700	4,770	4,700	4,550	4,520	4,220
		5	NA	4,760	4,820	4,740	4,570	4,550	4,230
Closed to Motor Vehicles	Miles	1	1,085	970	930	920	890	820	935
		2	NA	955	800	820	935	845	955
		3	NA	1,105	910	910	1,045	865	985

Output/Effects	Unit	Decade	NC [1] (No Change)	K (WFC)	A (No Action)	J (DEIS-PA)	W (PA)	D (Wildlife)	L (ONRC)
Total Budget (1982 $)	Million $	1	NA	62.6	58.2	52.2	49.2	49.6	26.4
		2	NA	56.1	52.5	47.8	46.2	45.5	25.0
		5	NA	55.7	51.4	49.5	45.2	46.1	26.3
Present Net Value (15 Decade Total)	Million $	-	NA	3,503	3,184	3,060	2,858	2,780	1,607
Returns to Government	Million $	1	166.2	128.6	119.9	106.1	101.2	91.8	32.4
		2	NA	151.6	141.5	122.6	108.0	109.9	40.3
		5	NA	143.7	130.2	135.6	117.6	97.8	32.5
Payments to Counties	Million $	1	41.6	32.2	30.0	26.5	25.3	23.0	8.1
		2	NA	37.9	35.4	30.6	27.0	27.5	10.1
		5	NA	35.9	32.6	33.9	29.4	24.4	8.1
Change in Jobs (Relative to Historic level = 13,257)	Number	1	5,653	2,945	2,219	900	204	-167	-5,499
Change in Jobs (Relative to Alternative NC = 16,303)	Number	1	--	-2,078	-3,434	-4,753	-5,449	-5,820	-11,152
Change in Income (1982 $) (Historic Level = 340.4)	Million $	1	155.7	73.9	52.7	14.3	-5.6	-15.1	-172.8

Footnotes for Table II-21.

[1] NA = Data Not Available; could not be reasonably estimated, or compared to other Alternatives, since Alternative NC (No Change) is based on a significantly different set of assumptions than the other Alternatives, and could not be modeled with the current Willamette National Forest FORPLAN model. Section D4b, of Chapter II in the DEIS describes these differences.
[2] Approximately 7% of these acres would be shelterwood harvests
[3] TSI includes release from competing vegetation, precommercial thinning, and fertilization.
[4] Includes net green volume plus salvage, cull, unregulated, and miscellaneous convertible products. The average annual amount of timber sold 1977-1986 was 784 MMBF, and the amount harvested was 607 MMBF.
[5] Includes only live, sound wood.
[6] Historically the firewood supply has come from a portion of the cull material, and is included in the Timber Sale Program Quantity above.
[7] Old growth based on the Pacific Northwest Regional Guide definition.
[8] Includes both existing and potential habitat areas.
[9] Areas include contributing habitat from SOHAs and/or pileated woodpecker habitat.
[10] Population Trend Index; Population trend values by decade are compared to a current level of 1.00.
[11] Recreation visitor day use for the No Change Alternative was developed from previous inventories and yield tables and does not incorporate the latest methods of calculating RVD outputs.
[12] RVD outputs for the No Change Alternative are available for total dispersed use.
MRVDs = Thousands of Recreation Visitor Days
PAOT = Persons at One Time
M Acres = Thousand Acres
MWFUDs = Thousand of Wildlife and Fish User Days
M Smolt = Thousand Smolt (Young Anadromous Fish)
PTI = Population Trend Index%/bio-pot = Percent of Bio-potential
AUMs = Animal Unit Months
MMBF = Million Board Feet
MMCF = Million Cubic Feet
M Ac-Ft = Thousand Acre-Feet
Cu. Yds/Yr = Cubic Yards per Year
Additional information about these terms is included in the Glossary

Table II-22. Qualitative Resource Outputs, Environmental and Social Effects

1. The rate of change in scenic areas on the Forest.	
NC	Most areas of high scenic importance will change rapidly from natural appearing, slightly altered, and moderately altered landscapes to a condition that appears heavily altered.
K	Most areas of high scenic importance will change dramatically from natural appearing, slightly altered and moderately altered landscapes to a condition that appears heavily altered.
A	Most areas of high scenic importance will change rapidly from a natural appearing, slightly altered or moderately altered appearance to a landscape condition that appears moderately to heavily altered.
J	Most areas of high scenic importance will change gradually form natural appearing and slightly altered landscapes to landscape conditions that appear moderately to heavily altered.
W	Most areas of high scenic importance will change gradually from a natural or slightly altered appearance to landscape conditions that range between slightly altered and moderately altered.
D	Most areas of high scenic importance will change slowly. Areas that now appear moderately or heavily altered will,in time, recover to conditions that appear slightly altered. Other areas will remain or become natural appearing.
L	Most areas of high scenic importance will change very slowly in appearance from current conditions due to management activities. Changes in many areas of the Forest will be the result of natural processes. Areas that currently appear moderately to heavily altered will in time recover to a natural or slightly altered appearance.
2. Diversity of recreation opportunities.	
NC	Provides a wide range of dispersed recreation opportunities with an equal emphasis on semiprimitive motor and nonmotorized activities. Provides a high degree of off-road vehicle access to Forest lands. All existing public and privately managed developed recreation sites will remain open. The current trail system is maintained.
K	Emphasis is placed on Roaded Natural and Roaded Modified recreation opportunities with a minor amount of area provided for semiprimitive opportunities. Provides the highest degree of off-road vehicle access to Forest lands. All existing public and privately managed developed recreation sites will remain open and new sites would be developed to keep pace with user demand. The current trail system is maintained.
A	Provides a wide range of dispersed recreation opportunities with an equal emphasis on semiprimitive motor and nonmotorized activities. Provides a high degree of off-road vehicle access to Forest lands. All existing public and privately managed developed recreation sites will remain open. The current trail system is maintained.
J	Provides for a wide range of dispersed recreation activities with a moderate emphasis on both semiprimitive motor and nonmotorized opportunities. Provides for a moderate degree of off-road vehicle access to Forest lands. All existing public and privately managed developed recreation sites will remain open and several new sites would be developed 3o meet increases in demand. The current trail system is maintained and forty miles of new trails is proposed for development.
W	Provides for a wide, yet balanced, range of dispersed recreation activities with a moderate emphasis on both semiprimitive motor and nonmotorized opportunities. Provides for a moderate degree of off-road vehicle access to Forest lands. All existing public and privately managed developed recreation sites will remain open and new sites will be developed to meet increases in public demand. The current trail system is maintained and sixty miles of new trails are proposed for development.
D	Provides a balanced range of dispersed recreation activities with a major emphasis on maintaining semiprimitive opportunities. Provides for a modest degree of off-road vehicle access to Forest lands. All existing public and privately managed developed recreation sites will remain open and new sites would be developed to meet increases in future public demand. The current trail system is maintained and 68 miles of new trails are proposed for development.

Table II-22 Cont. Qualitative Resource Outputs, Environmental and Social Effects

L	Provides for a wide range of dispersed recreation activities with a major emphasis on maintaining semiprimitive recreation opportunities. Also provides for the designation of selected areas as Wilderness, and Wilderness Study for others. Provides for a modest degree of off-road vehicle access to Forest lands. All existing public and privately managed developed recreation sites will remain open. The current trail system is maintained and forty miles of new trail is proposed for development.
3. Diversity and distribution of wildlife habitat.	
NC	Lowest rating for diversity and distribution of wildlife habitat. Landscape highly fragmented, special and unique habitat highly impacted.
A	Low rating for diversity. Mininum distribution met for Management Requirements. Habitat for interior forest species becomes isolated in islands with forest landscape highly fragmented. Special and unique habitats highly impacted.
K	Low rating for diversity. Mininum distribution met for Management Requirements. Habitat for interior forest species becomes isolated in islands with forest landscape highly fragmented. Special and unique habitats highly impacted.
J	Low to Moderate rating for diversity. Minimum distribution met for Management Requirement. Dead and defective tree habitat above MR. Interior forest habitat becoming fragmented and isolated in islands. Moderate impact to special and unique habitat.
W	Moderate to High rating for diversity. Minimum distribution met for Management Requirement. Dead and defective tree habitat above MR. Fragmentation of interior forest habitat delayed. Emphasis on providing corridors for connectivity between habitat islands reduces potential for isolation. Low impact to special and unique habitats.
D	Moderate rating for diversity. Distribution exceeds Management Requirements. Dead and defective tree habitat above MR. Interior forest habitat becoming fragmented and isolated in islands. Low impact to special and unique habitat.
L	High rating for diversity. Excellent distribution of habitat exceeds Management Requirements. Dead and defective tree habitat a highest level. Interior forest habitat maintained, fragmentation reduced, connectivity of interior habitats maintained or restored. Low impact to special and unique habitat.
4. Lifestyles	
NC	Jobs will be up considerably, especially timber related employment. Reduced opportunity for semiprimitive and roaded natural recreation types. Demand for hunting and fishing opportunities will be allowed to increase.
K	Jobs will increase from historic levels, especially timber related employment. Develop recreation opportunities will increase considerably, with reduced opportunities in semiprimitive and semiprimitive nonmotorized recreation types. Overall scenic quality will be low to moderate.
A	Jobs will increase from historic level, especially timber related employment. Developed recreation and dispersed recreation will continue to increase for 2 decades. Overall scenic quality will be low to moderate.
J	Overall jobs will increase somewhat from historical levels, but timber related employment will decrease. Recreation and leisure activities would remain about the same as the No Action Alternative with more unroaded recreation opportunities. Overall scenic quality will be moderate to high.
W	Overall jobs will increase slightly from historical levels but timber related employment will decrease. Jobs related to recreation will increase offsetting the loss of timber related jobs. Increase opportunities for all developed and dispersed recreation activities is expected with the exception of a slight decrease in semiprimitive nonmotorized. Overall visual quality will be moderate to high.
D	Timber related jobs would be relatively low within the range of Alternatives. Jobs related to recreation will offset the loss of timber related jobs somewhat but a net loss of jobs is expected. Potential hunting and fishing activities will increase as well as developed and dispersed recreation opportunities. Overall scenic quality will be high.

Table II-22 Cont. Qualitative Resource Outputs, Environmental and Social Effects

L	Jobs will decrease considerably, with timber related jobs the lowest for any Alternative. All types of recreation opportunities will increase. In addition, all roadless areas will be maintained in an unroaded condition.
5. Community Infrastructure	
NC	Increased timber receipts to fund county road and school systems.
K	Increased timber receipts for 4 decades but then decreases slightly. Small expected effect on county road and school systems.
A	Slight increase in timber receipts for the first 5 decades which would keep county road improvements and school funding at or near present levels.
J	Funding for county infrastructure projects would remain above historical levels but funding would vary (increasing then decreasing) for the first 5 decades.
W	Timber receipts will increase for 4 decades starting above historical levels; however, funding for county infrastructure will remain lower than current levels for the first 4 decades.
D	Timber receipts near historical average.
L	Drastic reduction (about three-quarter) of timber related receipts to counties. County infrastructures would be negatively affected as less money would be received from Federal timber receipts.

Response To Issues And Concerns

One of the primary reasons for developing Alternatives is to provide a variety of responses to the issues and concerns affecting the Forest and the public. Each Alternative represents a unique approach to issue resolution. While all Alternatives address the entire range of issues and concerns, none can successfully resolve all of them concurrently. This is because the issues and concerns reflect the full range of desires for, use of, and outputs from, a limited land and resource base. Some of these outputs and uses are competitive or mutually exclusive, thus creating the need for a variety of issue resolution packages or Alternatives.

Table II-23 displays in narrative terms the responsiveness of each Alternative to the major issues described in Chapter I. The results are presented here in words to assist in interpretation of the Alternatives. Each of the issues also has a set of quantified indicators of responsiveness that are presented in Table II-27 and described in Appendix A. The final section of this Chapter includes a discussion of trade-offs between quantified indicators.

Table II-23. Comparison of Issue and Concern Resolution by Alternative

1. Old Growth - Amount of existing old growth remaining after 5 decades of harvest. There are currently 594,800 acres which meet the Region Six definition of old growth.	
NC	Maintains 44% of existing old growth (259,800 acres).
K	Maintains 51% of existing old growth (305,100 acres).
A	Maintains 57% of existing old growth (337,000 acres).
J	Maintains 57% of existing old growth (341,400 acres).
W	Maintains 61% of existing old growth (365,200 acres).
D	Maintains 62% of existing old growth (367,800 acres).
L	Maintains 88% of existing old growth (523,100 acres).
2. Dispersed Recreation - Percent of Forest's inventoried potential semiprimitive motor and nonmotorized recreation opporuntities provided.	
NC	Maintains 33% of the Forest's dispersed semiprimitive motor and nonmotorized opportunities; 27% motor and 6% nonmotorized.
K	Maintains 21% of the Forest's dispersed semiprimitive motor and nonmotorized opportunities 6% motor and 15% nonmotorized.
A	Maintains 32% of the Forest's dispersed semiprimitive motor and nonmotorized opportunities 26% motor and 6% nonmotorized.
J	Maintains 39% of the Forest's dispersed semiprimitive motor and nonmotorized opportunities 32% motor and 7% nonmotorized.
W	Maintains 39% of the Forest's dispersed semiprimitive motor and nonmotorized opportunities 31% motor and 8% nonmotorized.
D	Maintains 71% of the Forest's dispersed semiprimitive motor and nonmotorized opportunities 63% motor and 8% nonmotorized.
L	Maintains 66% of the Forest's dispersed semiprimitive motor and nonmotorized opportunities 64% motor and 2% nonmotorized.
3. Roadless Lands - Inventoried Lands to be maintained in an undeveloped condition.	
NC	Maintains 26% (45,400 ac.) of the Forest's Inventoried Roadless Areas in an undeveloped condition.
K	Maintains 15% (25,300 ac.) of the Forest's Inventoried Roadless Areas in an undeveloped condition.
A	Maintains 35% (59,800 ac.) of the Forest's Inventoried Roadless Areas in an undeveloped condition.
J	Maintains 46% (79,700 ac.) of the Forest's Inventoried Roadless Areas in an undeveloped condition.
W	Maintains 53% (92,100 ac.) of the Forest's Inventoried Roadless Areas in an undeveloped condition.
D	Maintains 80% (136,900 ac.) of the Forest's Inventoried Roadless Areas in an undeveloped condition.
L	Maintains 85% (145,900 ac.) of the Forest's Inventoried Roadless Areas in an undeveloped condition.
4. Scenic Quality - Expected future condition of the Forest's 10 major viewsheds.	
NC	One of the Forest's 10 viewsheds will be maintained in a natural appearing condition, 2 will remain or become moderately altered, and 7 will appear heavily altered.

K	None of the Forest's 10 viewsheds will be maintained in a natural appearing or slightly altered condition, 3 will remain or become moderately altered, and 7 will appear heavily altered.
A	One of the Forest's 10 viewsheds will be maintained in a natural appearing condition, none will become slightly altered, 2 will remain or become moderately altered, and 7 will appear heavily altered.
J	One of the Forest's 10 viewsheds will be maintained in a natural appearing condition, however, 3 will be maintained in a slightly altered condition, 5 will remain or become moderately altered, and 1 will appear heavily altered.
W	One of the Forest's 10 viewsheds will be maintained in a natural appearing condition, 4 in a slightly altered condition,5 will remain or become moderately altered, and none will appear heavily altered.
D	Six of the Forest's 10 viewsheds will be maintained in a natural appearing condition, 4 in a slightly altered condition, and none of the areas will appear moderately or heavily altered.
L	Seven of the Forest's 10 viewsheds will be maintained in a natural appearing condition, 3 in a slightly altered condition, and none of the areas will appear moderately or heavily altered.
5. Allowable Sale Quantity - Amount of timber estimated to be sold annually (in million board feet), and the acres suitable for timber management.	
NC	This alternative represents the potential yield of the current TM Plan, with an ASQ of 810 MMBF, 26% above the current Proposed Program. The suited landbase is 1,064,600 acres.
K	The ASQ is 650 MMBF, which is 1% above the current program level, on a suited landbase of 932,800 acres.
A	The ASQ is 608 MMBF, which is 94% of the current program level, with a suited landbase of 874,300 acres.
J	The ASQ is 530 MMBF, which is 82% of the current program level, with a suited landbase of 853,400 acres.
W	The ASQ is 491 MMBF, which is 76% of the current program level, with a suited landbase of 774,600 acres.
D	The ASQ is 476 MMBF, which is 74% of the current program level, with a suited landbase of 719,400 acres.
L	The ASQ is 150 MMBF, which is 23% of the current program level, with a suited landbase of 553,100 acres.
6. Water Quality - Risk to water quality and stream conditions.	
NC	Approximately half of the forest land is at High Risk of adverse effects to water quality and stream conditions, because the levels of timber harvest result in hydrological recovery below the desired levels, because of the cumulative effects of timber harvest in riparian areas of Class I, II, and III streams, and the risk associated with harvest of steep potentially unstable areas adjacent to Class IV streams.
K	Approximately 29% of the Forest is at high risk; 27% at moderate risk; and 44% at low risk. The risk is associated with reasons described for Alternative NC.
A	Approximately 28% of the Forest is at high risk; 25% at moderate risk; and 47% at low risk. The risk is associated with reasons described for Alternative NC.
J	Approximately 18% of the Forest is at high risk; 17% at moderate risk; and 65% at low risk. The risk is associated with reasons described for Alternative NC.
W	All of the Forest is at Low Risk, due to the harvest level compatible with desired levels of hydrological recovery, to full protection of riparian areas along Class I, II, and III streams, and provisions for protection of potentially unstable Class IV streams.
D	Approximately 12% of the Forest is at High Risk, 10% is at moderate risk; and 78% is at low risk. The relatively low risk is associated with protection of Class I and II riparian areas, and the relatively low level of timber harvest.
L	All of the Forest is at Low Risk due to the low level of harvest, full riparian protection on Class I, II, and III streams, and provisions for protection of potentially unstable Class IV streams.

7. Wildlife and Sensitive Plant Habitat - Elk and Deer, Mature and Old Growth Habitat, Plant habitat, Dead and Defective Tree Habitat, Habitat for T&E Species.	
NC	Elk and deer habitat capability declines rapidly leaving existing popualtions at high risk for winter mortality. Mature and old growth habitat isolated within Wilderness and in small isolated islands. Sensitive plant habitat highly impacted. Dead and defective tree habitat poorly distributed with potential loss of many snag dependent species. T&E species protected at minimum levels required by Recovery Plans.
K	Elk and deer habitat capability declines below existing condition with few areas managed for habitat quality. Some existing populations at high risk for winter mortality. Mature and old growth habitat isolated in wilderness and in habitat networks established to meet Management Requirements. Sensitive plant habitat highly impacted as most of the landscape outside wilderness is converted to managed plantations. Dead and defective tree habitat distributed with moderate amounts of habitat for dependent species. T&E species protected at minimum levels required by Recovery Plans.
A	Elk and deer habitat capability declines in some areas and improves in others. Slightly increased potential for populations, but some local populations at high risk for winter mortality. Mature and old growth habitat isolated in wilderness and in habitat networks established to meet Management Requirements. Sensitive plant habitat highly impacted as most of the landscape outside wilderness is converted to managed plantations. Dead and defective tree habitat poorly distributed with low amounts of habitat for dependent species. T&E species protected at minimum levels required by Recovery Plans.
J	Elk and deer habitat capability increases above existing condition with specific areas managed for habitat quality. Optimal cover provided on some winter ranges reducing risk for winter mortality. Mature and old growth habitat isolated in wilderness and in habitat networks established to meet Management Requirements. Sensitive plant habitat moderately impacted as most of the landscape outside wilderness is converted to managed plantations, and only portions of the perimeter of special and unique habitats protected. Dead and defective tree habitat distributed with moderate amounts of habitat for dependent species. T&E species protected at minimum levels required by Recovery Plans.
W	Elk and deer habitat capability increases above existing condition with specific areas managed for habitat quality. Optimal cover provided on some winter ranges reducing risk for winter mortality. Mature and old growth habitat in Wilderness and in habitat networks are linked by corridors managed to protect riparian resources and maintain vegetation diversity. Sensitive plant habitat protected as the landscape outside wilderness is converted to managed plantations. Perimeters of special and unique habitats protected. Dead and defective tree habitat distributed with moderate amounts of habitat for dependent species. T&E species and habitat protected to meet Recovery Plan objectives.
D	Elk and deer habitat capability increases above existing condition with highest amount of area managed for habitat quality. Optimal cover provided on most winter ranges reducing risk for winter mortality. Mature and old growth habitat in Wilderness, and in habitat networks established above Management Requirements to increases distribution and habitat quality. Sensitive plant habitat protected as lands available for timber production is converted to managed plantations. Perimeters of special and unique habitats protected. Dead and defective tree habitat well distributed with high amounts of habitat for dependent species. T&E species and habitat protected above Recovery Plan objectives.
L	Elk and deer habitat capability increases above existing condition with specific areas managed for habitat quality. Optimal cover provided on all winter ranges reducing risk for winter mortality, but reduced forage openings could limit population potential. Mature and old growth habitat provided at high levels forest-wide with increases in long term habitat capability for interior forest dwelling species. Sensitive plant habitat rarely impacted as most of the landscape outside wilderness recovers from past management practices. Most special and unique habitats protected. Dead and defective tree habitat well distributed with high amounts of habitat for dependent species. T&E species and habitat protected above Recovery Plan objectives.

Economic Comparisons Of Alternatives

The economic implications of alternatives are displayed in Tables II-24, II-25, and II-26. A discussion of the variations in costs, benefits, present net value, and cash flows among alternatives accompanies each table. These economic indicators could not be reasonably estimated for Alternative NC (No Change) since it is based on a set of assumptions different than those of the other alternatives, and could not be modeled with the current Willamette FORPLAN model. Additional detail on the differences is in Chapter II, Alternatives Considered in Detail.

Differences in Present Net Value

Tables II-24 and II-25 present information about the Present Net Value (PNV) of alternatives. Present net value is a quantitative measure of economic efficiency, and thus is a key variable in the comparison of alternatives. It is defined as the difference between the discounted value (benefits) of all outputs to which monetary values or established market prices are assigned and the total discounted costs of managing the planning area. "Discounting" is the procedure used to adjust all future costs and benefits to their present-day equivalent values in order to enable a meaningful comparison of dollar flows through time. A discount rate of 4% has been used. An alternative discount rate of 7-1/8%, sometimes used by the Forest Service, was also evaluated. Since relative rankings of alternatives were unaffected with the 7-1/8% rate, only the 4% rate is shown. The discounted benefit and cost flows represent the potential net dollar returned for each alternative: the larger the PNV, the greater the potential return. For a more detailed discussion of PNV calculation and its significance, refer to Appendix B.

By providing a monetary, quantitative measure of economic efficiency, present net value is a useful indicator of differences among alternatives in terms of their total output of public benefits. A full assessment of net public benefits, however, also requires a consideration of primary benefits and costs that have not been assigned a dollar value. Included in this category are outputs such as increased populations of some wildlife species, and physical conditions such as the maintenance of scenery, and clean water. The value of such outputs and effects cannot be reasonably reflected in dollar terms because the data and/or methodology needed to do so are not available.

Another aspect for describing differences among alternatives and ultimately selecting a preferred alternative is the degree of issue resolution. Secondary benefits and costs, such as employment, are often important for understanding the degree of issue resolution. See the section, Major Trade-Offs Among Alternatives in this chapter for a summary of issue resolution.

Table II-24 displays the present net value, total discounted benefits, and total discounted cost for each alternative. Alternatives are ranked in order of decreasing present net value. The change in PNV criteria between alternatives is also displayed. These changes in PNV between alternatives measure the net economic value of the priced outputs that would be forgone if an alternative with a lower PNV were selected. These differences in PNV would have to be compared against the differences in non-priced benefits for the complete comparison of Alternatives.

Table II-25 disaggregates the benefits and costs. It displays the contributions of specific priced outputs to total benefits and assigns approximate costs to major accounting or budgeting categories. Note that it would be incorrect to assume a direct relationship between the dollar benefits associated with a particular output and the cost figure assigned to the same resource. This is because many Forest-wide outputs are produced jointly and the costs associated with producing any single one cannot be accurately disaggregated and assigned.

Table II-24. Differences in Economic Efficiency Criteria

		Alternatives						
Item	**Units**	**NC**	**K**	**A**	**J**	**W**	**D**	**L**
Present Net Value PNV	Million $	NA	3,503	3,184	3,060	2,858	2,780	1,607
Difference in PNV		NA	-319	-124	-202	-78	-1173	
Present Value of Costs Discounted Costs	Million $	NA	(3,370)	(3,179)	(2,796)	(2,626)	(2,658)	(1,036)
Difference in Costs		NA	(-191)	(-383)	(-170)	(+32)	(-1,622)	
Present Value of Benefits Discounted Benefits	Million $	NA	6,874	6,363	5,856	5,484	5,438	2,642
Difference in Benefits		NA	-511	-507	-372	-47	-2795	

Table II-25. Present Net Value, Discounted Benefits, and Discounted Costs[1]

Item	Alternative						
	NC[2]	K	A	J	W	D	L
PNV	NA	3,503	3,184	3,060	2,858	2,780	1,607
Discounted Benefits							
Timber	NA	5,465	5,123	4,520	4,131	4,010	1,281
Market Recreation Value	NA	6	5	6	7	6	6
Other	NA	1	1	1	1	1	1
Nonmarket Recreation	NA	1,403	1,234	1,329	1,346	1,421	1,354
Total	NA	6,875	6,363	5,856	5,485	5,438	2,642
Discounted Costs							
Recreation[3]	NA	(145)	(113)	(125)	(140)	(170)	(134)
Fish & Wildlife	NA	(141)	(130)	(103)	(96)	(110)	(79)
Range	NA	(1)	(1)	(1)	(1)	(1)	(1)
Timber[4]	NA	(438)	(421)	(384)	(350)	(356)	(130)
Water/Air/Soils	NA	(38)	(38)	(37)	(36)	(37)	(27)
Minerals/Geology	NA	(8)	(8)	(7)	(6)	(6)	(2)
Lands	NA	(11)	(11)	(11)	(11)	(11)	(11)
Facilities (Roads)	NA	(403)	(376)	(354)	(327)	(284)	(195)
Planning	NA	(2)	(2)	(1)	(1)	(1)	(1)
Protection	NA	(166)	(1,58)	(134)	(124)	(126)	(40)
Administration	NA	(132)	(125)	(108)	(99)	(98)	(33)
Purchaser's Costs	NA	(1,885)	(1,797)	(1,531)	(1,435)	(1,458)	(383)
Total		(3,370)	(3,179)	(2,796)	(2,626)	(2,658)	(1,036)

[1]Direct comparisons of benefits and costs in millions of 1982 dollars displayed for individual resource outputs provide general indications of relationships but may be misleading because many multiple-use outputs have common costs of production which cannot be reliably separated and attributed to individual resources. Alternatives displayed in order of decreasing present net value.

[2]NA = Data Not Available; could not be reasonably estimated, or compared to other alternatives, since Alternative NC (No Change) is based on a significantly different set of assumptions than the other alternatives, and could not be modeled with the current Willamette National Forest FORPLAN model. The alternative NC Description under "Alternatives Considered in Detail," of Chapter II in the FEIS describes these differences.

[3]Costs are for the Wilderness and recreation programs.

[4]Includes all timber-related costs except roads.

Several of the entries in these two Tables require additional explanation to enhance understanding. Timber benefits are expressed in terms of total pond value (i.e., the value delivered at the mill) rather than stumpage value. This approach was taken to be able to show differences in logging costs between the major drainages within the planning model. Thus, the total discounted benefits shown in Table II-24 and the timber benefits in Table II-25 include the value added by logging. The same thing applies on the cost side. In Table II-25 the total logging costs are referred to as "Purchaser's Costs." The total discounted costs in Table II-24 and Table II-25 include logging costs. Non-market recreation represents priced output used for analysis, but not actually six collected as cash receipts.

This approach does not affect the PNV calculation because the value added by logging is offset by the logging costs. The content of the other cost and benefit categories is explained in footnotes below each Table.

Variations in present net value among alternatives are due to the wide range of possible costs and benefits represented in the alternatives. Each alternative is designed to produce a unique set of both priced and nonpriced outputs and effects, each of which generates a distinct pattern of values and costs.

The principal factors influencing the level of priced benefits, costs, and present net value on the Willamette National Forest are the amount and timing of timber harvest. Since this activity has relatively large investment costs and dollar returns associated with it, the volume harvested is the primary determinant of the magnitude of the economic criteria in each alternative. The timing of harvest of is also very important. Discounting diminishes the contribution to PNV of returns gained in the later decades. This means that harvesting high value timber (such as old growth Douglas fir) at full yield as early as possible will provide the highest market values. This effect is illustrated by comparing the acres harvested in decade 1 between alternatives W and D. Even though Alternative D harvests more acres than Alternative W, Alternative W has a higher timber volume and higher PNV than Alternative D. This is because Alternative W harvests more large saw and old growth Douglas fir/Hemlock in the first few decades than D. See Table II-22, Clearcut Acres, for the acres harvested and Table II-24 for the PNV's. These values must be weighed against the loss of non-priced benefits when comparing any two alternatives.

Differences in the amount and timing of land availability accounts for the primary differences in present net value, benefits, and costs. Nonmarket outputs, such as semiprimitive recreation opportunities, anadromous fish production, and fish and wildlife use, cannot compete with timber harvest economically and would not be produced at levels that affect timber harvest volumes or schedules based solely on economic efficiency criteria. Objectives for these resources can only be achieved through the use of constraints, specific prescriptions, or land allocations. Generally, an alternative designed to achieve objectives related to these types of resources will have lower timber harvest levels but higher recreation and fisheries benefits. As a result, differences in PNV between low-timber alternatives and high-timber alternatives are somewhat smaller than if timber was the only resource having an economic value. Some of these differences can be seen in Table II-25. Note that Alternatives K and L show exceptions to this general trend. Alternative K shows a high discounted benefit for nonmarket recreation even though it has the highest level of timber harvest. This is because of the emphasis placed on developed and motorized recreation in K. Alternative L shows a decrease in nonmarket recreation discounted benefits from Alternative D, even though L harvests less timber than D. This is because of L's emphasis on non-roaded allocations allows fewer acres to contribute toward roaded recreational opportunities. When making comparisons such as these, one must consider the overall desired mix of recreational opportunities, not just the composite discounted value.

The production of some priced outputs is not related to timber harvest but does vary based on different levels of management provided. Outputs in this category include domestic livestock grazing use, wilderness use, and developed recreation use. Some of the administrative and support costs of the agency remain constant across all alternatives. These are included in the cost categories of Table II-25.

In addition to the priced outputs discussed above, there are several major outputs, effects or conditions associated with alternatives to which no monetary value can be reasonably assigned. While these outputs are not directly included in the calculation of present net value, they are an important component of issue resolution and, therefore, net public benefits. These outputs and their relationship to priced outputs and PNV include:

- Visual Quality Objectives - As land assigned to visual prescriptions increases, present net value decreases because of restrictions placed on timber harvest. Visual quality objectives are complementary with other amenity-oriented outputs.

- Roadless Area Acreage - Since retention of roadless lands in an unroaded condition and timber harvest are mutually exclusive, increases in roadless acres usually lead to decreases in PNV given the relative values of timber and semiprimitive recreation use. Roadless area retention is complementary with other amenity-oriented outputs.

- Old-Growth Retention - Increasing the amount of old-growth unavailable for harvest has significant impacts on harvest levels and present net value. Because old-growth distribution goals for wildlife and other purposes often dictate that highly productive and readily accessible areas remain unharvested, this nonpriced output can be particularly expensive in terms of PNV. Old-growth retention is complementary to other amenity-oriented outputs.

- Socioeconomic Indicators - Timber harvest is the activity which has the greatest effect on many of the major socioeconomic indicators such as employment, total income, and payments to counties. Production of other priced and nonpriced outputs generally lead to reduced levels for these indicators if their production leads to reduced timber harvest levels.

Numerous other resource management objectives are achieved through land allocations, activity scheduling, or constraints. To the extent that these objectives reduce the available timber harvest land base or restrict harvest through longer rotations, limits in harvest unit sizes, or other means, a reduction in present net value can be expected. The production of both priced and nonpriced outputs are important in the determination of net public benefits.

Economic values associated with potential future production of locatable minerals, oil and gas, geothermal energy or hydroelectric power are not included in the alternatives. The possibility of future development of mineral and energy resources on the Forest does exist. However, the timing of development and the magnitude of production are both highly speculative. It is possible that the economic value of these activities will vary by alternative if they are undertaken.

Differences in Costs

The discounted costs shown in Tables II-24 and II-25 include Forest Service budget costs and costs to others. Non-Forest Service costs are composed primarily of the stump-to-mill costs associated with timber harvest. These represent between 50 and 60% of the total costs of each alternative.

The budget costs associated with each alternative fall into two distinct categories: capital investments and operations/maintenance costs. Capital investments are expenditures on the Forest's physical plant which are designed to provide long-term returns. Examples include road construction, tree planting, and fish habitat improvement structures. Operations/maintenance costs cover those activities which are necessary to conduct the day-to-day business of the Forest. Such things as road maintenance, timber sale administration, and habitat condition monitoring fall into this category.

On the Forest most capital investment costs are for either road construction or activities associated with timber production. These form a substantial part of the projected Forest Service budget for each alternative. Projected annual budget costs in the 1st decade are higher than current levels for all alternatives except L. This is because of the increased emphasis on increasing programs other than timber harvest. Many of the higher costs are for measures to mitigate the adverse effects of timber

harvest. Other major cost increases are due to plans to achieve a more balanced program of resource outputs for recreation, wildlife, soils, water, air quality, and protection. Costs have also increased significantly for planning and administration of NEPA decisions due to the high level of controversy and appeals related to natural resource management. Even though a budget cost for Alternative NC (No Change) was not estimated, a higher budget would also be needed to implement this alternative due to the high harvest level.

Projected budget levels generally parallel harvest levels. The unit costs of harvest-related activities vary considerably, depending on the characteristics of the area in which they occur. For example, the costs of timber sale preparation, fuel treatment, and silvicultural treatments all increase as difficulty of access increases, while road construction costs vary with slope. The development and use of all costs incorporated in the planning analysis is summarized in Appendix B.

Differences in Economic Benefits and Cash Flows

Tables II-24 and II-25 compare alternatives in terms of PNV based on consideration of all values and costs. There are, however, three subcategories of "value" and two of "cost". Value can be disaggregated into non-market value, market value, and Forest Service receipts (which are a part of total market value). Costs can be disaggregated into Forest Service (budget) costs and costs to others.

Total discounted economic benefits associated with market and nonmarket resources are displayed by resource for each alternative in Table II-25. Market resources include timber, recreation user fees, recreation special uses, minerals, and special uses for which fees are collected. Nonmarket resource values are dollar values assigned to dispersed recreation, Wilderness recreation, forms of developed recreation for which no fee is charged, and recreation generated by fish and wildlife. The purpose of assigning dollar values to these is to reflect full economic value, even though none or only part of the value associated with particular resources is actually collected as fees under current laws and policies.

Comparison of total economic benefit to total cost measures the overall economic efficiency of each alternative. Another important consideration is the flow of dollars to and from the U.S. Treasury. In this comparison the important factors are receipts (the portion of total market output collected as fees or payments) and budget costs. The difference between the two is the net cash flow to or from the Treasury. Net cash flows for the 1st, 2nd and 5th decades for each alternative are displayed in Table II-26. The major differences among both economic values and cash receipts are due to different levels of timber production.

The rows labelled "Noncash Benefits" in Table II-26 represent the total estimated dollar value of the nonmarket resources to which values have been assigned. They are presented to give the reader an idea of the relationship between the actual receipts generated by the alternatives and the value of the nonmarket outputs to which values have been assigned.

As discussed earlier, total benefits and total costs are influenced primarily by the level of timber harvest. The same relationship is maintained for cash receipts. Over 99% of the revenues received by the Forest are from the sale of timber. Revenues from other sources are quite small relative to the value of the timber volume harvested.

Differences in noncash benefits in the 1st decade are generally very small due to the relative shifts in the type of recreation program emphasis within each alternative. Alternatives with high timber harvest levels produce more developed and roaded recreation, while those with less timber harvest produce more unroaded recreation. Second and 5th decade noncash benefits reflect anticipated increases in

recreation use which accounts for a general rise in benefits. See the sections on Recreation in Chapters II and IV of this EIS for more details on the mix of recreational opportunities provided by each alternative.

Table II-26. Average Annual Cash Flows [1]

	Alternatives						
Decade	**NC [2]**	**K**	**A**	**J**	**W**	**D**	**L**
Decade 1							
Cash Flow [3]	NA	66	62	54	52	42	6
Total Forest Service Budget [4]	NA	63	58	52	49	50	26
Returns to Government [5]	166	129	120	106	101	92	32
Noncash Benefits [6]	NA	40	41	41	40	38	41
Decade 2							
Cash Flow [3]	NA	96	89	75	62	64	15
Total Forest Service Budget [4]	NA	56	52	48	46	45	25
Returns to Government [5]	NA	152	141	123	108	109	40
Noncash Benefits [6]	NA	55	52	55	55	55	53
Decade 5							
Cash Flow [3]	NA	88	79	86	72	52	6
Total Forest Service Budget [4]	NA	56	52	48	46	45	25
Returns to Government [5]	NA	144	131	136	118	97	32
Noncash Benefits [6]	NA	71	53	60	62	74	63

[1]Millions of 1982 undiscounted dollars displayed in order of decreasing present net value.
[2]NA = Data Not Available; could not be reasonably estimated, or compared to other alternatives, since Alternative NC (No Change) is based on a significantly different set of assumptions than the other alternatives, and could not be modeled with the current Willamette National Forest FORPLAN model. The Alternative NC Description under "Alternatives Considered in Detail," of Chapter II in the FEIS describes these differences.
[3]The difference between the receipts and costs shown.
[4]Includes all Forest Service costs.
[5]Includes timber stumpage receipts and miscellaneous receipts.
[6]Noncash benefits are those not collected as cash receipts.

Major Trade-Offs Among Alternatives

This section summarizes the relationships among economic values, and the responses of the alternatives to selected issues. The purpose is to highlight major economic and noneconomic trade-offs that can be quantified by using indicators of responsiveness to issues as a means of comparing alternatives. A complete understanding of the differences among alternatives requires reading Chapter II, IV, and Appendix B. The issues are discussed in detail in Chapter I and Appendix A.

To provide a partial framework for assessing trade-offs, the long-term resource demands of the nation, region, and local communities are briefly summarized. Selected economic values and quantified indicators of responsiveness to issues are then tabulated. Finally, differences and similarities among individual alternatives are summarized in terms of major trade-offs among competing objectives or responses to issues.

National, Regional, and Local Overview

The 1984 supplement to the Resources Planning Act (RPA) Assessment estimates that total national demands will rise for all goods and services produced by the National Forests. At the same time, there will be a continuing strong desire to protect and enhance the quality of the environment.

The Regional Guide for the Pacific Northwest Region estimates that demands for all outputs of the National Forest will also rise in Oregon and Washington. Recreation use is expected to increase as the population increases and its characteristics change, with the bulk of recreation use coming from residents of the region. Demand for Wilderness recreation is expected to exceed the available supply within the Region's Wilderness Preservation System.

A survey of recreation associated with fishing, hunting, and wildlife (USDI 1988) indicates that more than three of every four Americans pursue some type of fish or wildlife activity. Demand for hunting and sport fishing is expected to increase by one-third between 1985 and 2000. Nonconsumptive uses of wildlife and fish are also expected to increase.

The National Forests of the Pacific Northwest are the National Forest System's primary timber producer, with almost one-half of the current National Forest harvest coming from this region. The quantity of timber demanded regionally in 2000 is expected to be about 1% greater than the 1976 demand level. The stumpage price of timber, however, is expected to rise substantially.

The local situation is generally similar to that of the Region. Many of the Wilderness and non-Wilderness areas providing primitive and semiprimitive recreation opportunities are currently being used at levels which exceed their capacity to provide high quality experiences. The demand for this type of recreation on the Forest is expected to increase over the next 10 to 50 years.

Demand for timber from the Forest is also projected to increase over the next 10 to 15 years due to anticipated reductions in supply from private and other public lands in the central and southern Willamette Valley together with a strong market for wood products and fiber.

Growth in the recreation and tourism sectors of local and regional economies will add to the economic base, while the timber industry will remain a significant component of the area economy. These trends are discussed more thoroughly in the social and economic environment and timber sections of Chapter III.

Economic Values and Response to Major Issues

Alternatives are developed to provide different responses to public issues identified on the Forest. This section summarizes the quantifiable differences among alternatives in terms of economic criteria and responses to major issues. These issues are discussed in detail in Chapter I. A complete discussion of these indicators and their relationship to the major issues can be found in Appendix A, Issues, Concerns, and Opportunities Identification Process. The following presents another comparison of the responsiveness of alternatives to major issues. The issues and associated indicators of responsiveness include:

- Dispersed Recreation

  Land allocated to semiprimitive nonmotorized uses.
  Land allocated to semiprimitive motorized uses.
  Land allocated to Special Interest Areas.
  Trail construction in the 1st decade.

- Old-Growth

  Amount of old-growth/mature timber retained at the end of the 1st decade.

- Roadless Lands

  Acres of roadless areas left undeveloped.

- Scenic Quality

  Land allocated to a retention Visual Quality Objective.
  Land allocated to a partial retention Visual Quality Objective.
  Land allocated to a modification Visual Quality Objective.

- Timber Supply

  Allowable sale quantity in the 1st decade.
  Long-term sustained yield.

- Water

  Forest area with a "High" Risk watershed risk rating.
  Forest area with a "Moderate" Risk watershed risk rating.
  Forest area with a "Low" Risk watershed risk rating.
  Erosion in the 1st decade (debris slides).

- Wildlife, Fish, and Plant Habitat

  Land managed as spotted owl habitat areas.
  Elk population in the 1st decade.
  Deer population in the 1st decade.

Other indicators of both local and national concern include those which reflect the social and economic effects of alternatives. The quantifiable indicators of these concerns include:

- Present net value over 15 decades.
- Change in jobs in the 1st decade.
- Change in income in the 1st decade.
- Change in payments to counties in the 1st decade.
- Average annual net cash flow in the 1st decade.

Table II-27 displays the data for each indicator for all the alternatives.

Table II-27. Tradeoffs of Economic Benefits and Indicators of Response to Issues

Issues	Max PNV Bench -mark	Units	NC	K	A	J	W	D	L
Economics									
PNV	3.8	$MMM	NA[3]	3.5	3.2	3.1	2.9	2.8	1.6
Cash Flows 1st decade		$MM/Yr	NA	66	62	54	52	42	6
5th decade		$MM/Yr	NA	88	79	86	72	52	6
Noncash Benefits 1st Decade	39	$MM/Yr	39	40	41	41	40	38	41
5th decade		$MM/Yr	NA	71	53	60	62	74	63
Payments to Counties	33	$MM/Yr	39	32	30	27	25	23	8
Changes in Income[1]	NE[2]	$MM/Yr	156	74	53	14	-6	-15	-173
Changes in Jobs[1]	NE[2]	Number	5653	2945	2218	900	204	-167	-5499
Timber									
ASQ[7]	660	MMBF	810	650	608	530	491	476	150
ASQ[7]	113	MMCF	146	117	110	95	87	86	27
Long-Term Sustained Yield	123	MMCF	146	120	114	108	95	94	34
Recreation									
Special Interest Areas	NE[2]	M Acres[4]	1.1	2.8	1.1	22.6	31.1	15.2	3.4
Trail Construction[7]	NE[2]	Miles	0	0	0	4.0	6.0	6.8	4.0
Semiprimitive Nonmotorized		M Acres[4]	75.3	14.4	72.2	89.5	85.8	176.5	102.0
Semiprimitive Motorized		M Acres[4]	23.9	48.3	23.4	31.3	36.0	38.2	66.3
Water									
Low Watershed Risk[5]	NE[2]	% Area	NA	41	47	65	100	78	100
Moderate Watershed Risk[5]	NE[2]	% Area	NA	27	25	17	0	10	0
High Watershed Risk[5]	NE[2]	% Area	NA	29	28	18	0	12	0
Erosion (Debris Slides)[7]	NE[2]	M C.Yds	NA	85.6	80.3	67.0	28.5	33.4	23.9
Wildlife									
Spotted Owl Habitat	59	# Areas[4]	0	59	59	59	59	102	184
Elk Population	NE[2]	M Elk[6]	NA[3]	3.7	4.2	4.5	4.8	5.6	5.6
Deer Population	NE[2]	M Deer[6]	NA[3]	17.8	19.5	23.1	24.9	28.4	26.6
Scenic Quality									
Retention		M Acres[4]	88.6	72.0	77.9	90.5	118.8	142.1	265.1
Partial Retention		M Acres[4]	114.3	147.5	150.1	177.7	171.7	246.7	286.3
Modification		M Acres[4]	4.5	123.6	4.5	206.2	143.0	108.4	4.5
Old Growth									
Acres Remaining After 10 Years		M Acres	494.0	522.4	528.4	534.9	533.4	537.2	578.3
Roadless									
Area Allocated to Roadless	0	M Acres[4]	45.4	25.3	59.8	79.7	92.1	136.9	145.9

[1]Changes represent the total potential change in the 1st decade as compared to historical averages over the life of the current Forest Plan (1977-1985).
[2]NE = Not estimated, benchmarks were not analyzed as fully developed implementable alternatives.
[3]NA = Data Not Available; could not be reasonably estimated, or compared to other alternatives, since Alternative NC (No Change) is based on a significantly different set of assumptions than the other Alternatives, and could not be modeled with the current Forest FORPLAN model. See alternative Considered in Detail, Chapter II for additional information.
[4]Represents lands allocated to meet this objective.
[5]Percent of total Forest area at the end of the 1st decade in this watershed risk category. See Chapter IV, Water for further explanation.
[6]Represents end of 1st decade conditions.
[7]Units are average annual for 1st decade.

Differences and Similarities Among Alternatives

This section describes the major differences and similarities among alternatives in terms of the indicators of responsiveness listed in the previous section. The major factors influencing the economic indicators are described in Response to Issues and Concerns, Chapter II. More details on the outputs and effects of the alternatives can be found in the individual resource sections in Chapter IV. Table II-27 contains data used for these discussions; Tables II-24 through II-26 provide some supplemental information. The alternatives are described in order of decreasing present net value (PNV). The indicators for each issue are discussed sequentially for each alternative. Information for the maximum PNV benchmark is provided only as a reference point. Qualifiers such as low or high used in these discussions are relative to the upper and lower level of each output shown in Table II-27. A more detailed comparison of all the alternatives is found in Appendix B, Section H.

Many response factors show a consistent pattern across the range of alternatives. For example, the level of semiprimitive recreation opportunities are directly correlated with the amount of land suitable for timber harvest and the level of timber harvest in an alternative. This same general pattern of tradeoffs is also seen in the water and old growth issues. For water, increased percentages of the Forest are in the High and Moderate categories as the timber harvest levels increase while the acres of old growth remaining after the 1st decade decrease as the timber harvest level of the alternatives increase. The Roadless, Water and Vegetation sections of Chapter IV describes the relationship of these effects in more detail.

Most of the variation in economic response factors described in Response to Issues and Concerns, Chapter II, can be directly related to the amount of timber harvest in an alternative. This pattern does vary somewhat as a result of the level of recreation oriented benefits provided by an alternative. Alternatives with greater emphasis on recreation have higher levels of recreation benefits. Jobs and personal income variations among alternatives follow the same kinds of patterns as the other economic indicators.

The indicators that could be estimated for the No Change Alternative are displayed in Table II-27, and are described in this section. Many indicators could not be reasonably estimated because alternative NC (No Change) is based on a set of assumptions different than were the other alternatives, and could not be modeled with the current Forest FORPLAN model. Alternatives Considered In Detail, Chapter II describes these differences.

Maximum PNV Benchmark - *PNV: $3.8 Billion* - Opportunity Cost: None (Baseline for Comparison)

The Maximum PNV Benchmark identifies the mix of goods and services with market and assigned values that result in the largest excess of discounted benefits over discounted costs. It meets MRs for resource protection and produces a high level of timber harvest on a nondeclining yield schedule. It is summarized in Table II-27 for comparison purposes.

Alternative NC (No Change) - *PNV: NOT AVAILABLE* - Opportunity Cost: NOT AVAILABLE

Alternative NC would produce the highest level of timber of any alternative (allowable sale quantity of 146 million cubic feet annually). This figure represents the potential yield from the current Forest Land and Timber Management Plan (1977). Although many indicators were not estimated for this alternative, present net value, net cash flows, payments to counties, income, and jobs would all likely be at their highest level with this alternative due to the high level of timber harvest. Conversely, the amount of old growth remaining at the end of the 1st decade would be at the lowest level of any alternative.

Forest land allocations for dispersed recreation, roadless areas, and scenic management areas are those in the current Forest Plan (1977) and are intermediate within the range of alternatives. Since MRs are not a part of this alternative, spotted owl habitat areas would be located only where some other allocation prohibited timber harvesting. Consequently, they are at their lowest level with this alternative. Deer and elk populations were not estimated for this alternative. Although quantitative estimates of watershed impact ratings and erosion were not made for this alternative, the amount of land in the "high" watershed risk category, and the amount of erosion would likely be at their highest level due to the high timber harvest level.

Alternative K (Willamette Forestry Council) - *PNV: $3.5 Billion* - Opportunity Cost: $297 Million as compared to Maximum PNV

With the exception of Alternative NC, Alternative K would produce the highest level of timber of any alternative on a nondeclining yield schedule (117 million cubic feet annually in the 1st decade). This is 29 million cubic feet or 20% less than the harvest level under Alternative NC because of land allocations and application of management prescriptions to meet MRs for water, soil, and wildlife resources. The areas available for spotted owl habitat would increase by 14 for a total of 59 areas in Alternative K. As a result of the lower timber harvest levels, all of the economic indicators are correspondingly lower also. The acres of old growth left at the end of the 1st decade would be 522.4 M acres or 28.4 M acres more than Alternative NC.

The number of Forest acres allocated to dispersed recreation and roadless area retention are similar to Alternative NC, overall. There is, however, an increase in Alternative K of acres managed to meet a modification visual objective. Although watershed risk was not estimated for Alternative NC, based on the rate of harvest it is likely the effects would be similar to Alternative K; 29% of the Forest in the high risk category and 27% of the area at moderate risk of adverse watershed impacts.

Alternative A (No Action) - *PNV: $3.2 Billion* - Opportunity Cost: $319 Million as compared to Alternative K.

Alternative A would continue management of the Forest under the existing Forest Land and Timber Management Plan (1977). However, Forest direction is modified in this Alternative to meet MRs. The timber harvest under Alternative A, 110 million cubic feet, is a decrease of 7 million cubic feet per year from the harvest level under Alternative K. Present net value, payments to counties, and net cash flow drop slightly from the Alternative K level. Income and the number of jobs decrease proportionally with the timber harvest levels. Alternative A would retain 528.4 M acres of old growth at the end of the first decade or 6 M acres more than in Alternative K.

Forest land allocations for dispersed recreation, roadless areas, and scenic management areas (with the exception of Modification in K) are higher in Alternative A as compared to Alternatives K and NC. Spotted owl habitat areas would be protected at the MR level or the same level as Alternative K. Deer and elk populations in Alternative A would show a slight increase over Alternative K. Elk populations increase in Alternative A as compared to Alternative K due to a better balance of cover and forage habitat components and overall habitat quality. The watershed risk levels are similar between Alternatives K and A with over 50% of the Forest at high to moderate risk of adverse watershed effects.

Alternative J (DEIS Preferred) - *PNV: $3.1 Billion* - Opportunity Cost: $124 Million as compared to Alternative A.

Alternative J was formulated to provide relatively high levels of timber on a nondeclining yield basis in combination with production of amenity resources at intermediate levels. Timber harvest would be 95 million cubic feet annually. This level is 15 million cubic feet or 14% less than the first decade annual harvest in Alternative A. The difference in timber harvest between these two alternatives is due to more acres that would be managed for nontimber uses such as dispersed recreation and additional acres of reduced yields such as Retention and Partial Retention scenic objectives. Present net value, net cash flows, payments to counties, personal income, and the number of jobs are less in the first period as compared to Alternative A reflecting the increased emphasis on amenity resources. In Alternative J, 534.9 M acres of old growth or 6.5 M additional acres would remain under Alternative J after 10 years as compared to Alternative A. The amount of existing roadless area allocated to roadless prescriptions is 20 M acres greater in Alternative J than in A. The amount of new trails that would be built in Alternative J is 40 miles over the decade, as compared to no new trail construction in Alternative A.

Deer and elk populations increase slightly in Alternative J reflecting the increased amounts of optimum cover and other habitat enhancements. Spotted owl habitat would be provided at the MR level of 59 areas, unchanged from Alternative A. The lower first decade harvest level in Alternative J results in a 35% of the Forest area in a high or moderate risk category for adverse watershed effects as compared to 55% in the same categories in Alternative A.

Alternative W (FEIS Preferred) - *PNV: $2.9 Billion* - Opportunity Cost: $202 Million as compared to Alternative J.

Alternative W emphasizes the management of both commodity and noncommodity resources on the Forest at levels that would recognize the importance of maintaining intact, functional ecosystems and long term productivity. The timber harvest level in Alternative W would be 87 million cubic feet or 8% less than in Alternative J. Cash flows and payments to counties are only slightly less than in Alternative J, but other economic indicators show significant reductions. Spotted owls would be managed at the MR level of 59 areas, the same as Alternative J.

The amount of the Forest at high to moderate risk of adverse watershed effects decreases to 0%, a significant change from Alternative J. In addition, 12.4 M additional acres would be managed in a roadless condition. The amount of trails to be constructed in the first decade increases by 20 miles over the amount proposed in Alternative J to a total of 60 miles in Alternative W. Overall, the dispersed recreation opportunities in Alternatives J and W are similar. The acres of old growth remaining after 10 years shows a slight reduction (1,500 acres) from Alternative J. Elk and deer populations would increase slightly from Alternative J as a result of increased acres of optimal cover and additional emphasis on habitat management.

Alternative D (Wildlife) - *PNV: $2.8 Billion* - Opportunity Cost: $78 Million as compared to Alternative W.

Alternative D places a high emphasis on the management of wildlife and other amenity resources. This level of management would require reductions in the acres where timber is the primary production goal. The timber sale level under Alternative D is 86 million cubic feet which is similar to Alternative W. First period jobs, personal income, payments to counties, net cash flow, and present net value are

also reduced slightly compared to Alternative W. The old growth remaining at the end of the first decade would be 537.2 M acres or less than a 1% increase over Alternative W.

The increased emphasis on amenity resources would result in more acres allocated for semiprimitive nonmotorized dispersed recreation, scenic zones, roadless areas, and spotted owl habitat areas, as compared to Alternative W. The significant changes between Alternative W and Alternative D are in wildlife and watershed outputs and effects. In Alternative D, the number of designated spotted owl habitat areas is 102 compared to the MR level of 59 in Alternative W. Elk and deer populations would increase by 15 to 20% over Alternative W due to an emphasis on high quality habitat conditions and enhancement projects.

The amount of the Forest in the high to moderate risk category for adverse watershed effects increases from 0% in Alternative W to 22% in Alternative D. This increase is due largely to a harvest level similar to Alternative W on a smaller suitable land base and the decreased emphasis in Alternative D to maintain favorable watershed conditions at the subdrainage level.

Alternative L (Oregon Natural Resources Council) - *PNV: $1.6 Billion* - Opportunity Cost: $1,173 Million as compared to Alternative D.

Alternative L emphasizes the protection of remaining old growth and maintenance of the natural attributes of the Forest. Achievement of these goals would require further reductions in the acres where the primary goal is timber production. The timber harvest level is 27 million cubic feet or 59 million cubic feet less than Alternative D, and is the lowest of all alternatives. All the economic indicators are at their lowest level, reflecting the low timber harvest level. Conversely, Alternative L would retain the greatest amount of old growth at the end of the first decade of all the alternatives with 578.3 M acres or 41.1 M acres more than Alternative D.

Alternative L would maintain all of the current inventory of roadless area in a roadless condition. Approximately 145.9 M acres are allocated to roadless management prescriptions and an additional 169.4 M acres would be recommended for Wilderness designation. The acres that would be maintained in roadless allocations in Alternative L are the most of any alternative. In addition, 184 spotted owl habitat areas, enough to protect the known owl population outside of Wilderness, would be preserved. Deer populations would decrease due to the decrease in forage as a result of lower timber harvest levels. Due to the low level of timber harvest and large amount of land maintained in a natural condition, 0% of the Forest would be in the high or moderate risk category for adverse watershed effects. This is 22% less than the acres similarly rated under Alternative D.